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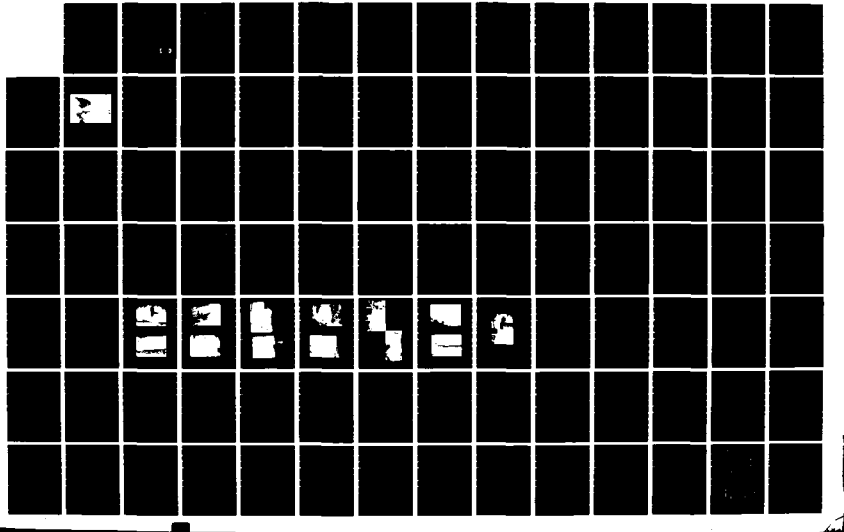

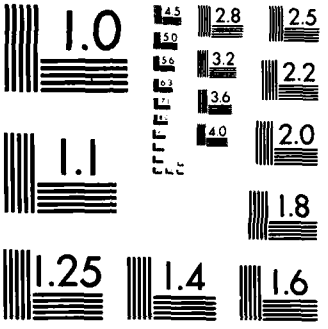

RICHELIEU RIVER BASIN
EAST MONTPELIER

MONTPELIER NO. 4
VT. 00048

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

FEBRUARY 1979

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Richelieu River Basin
East Montpelier, Vermont
Winooski River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is a concrete gravity dam with an overall length of 152 ft. and a height of 21 ft. The dam is classified as small and has a low hazard potential in the event of a dam failure. The dam is in poor condition. The lack of maintenance during the last 15-20 years may have rendered the dam economically unsalvageable. To avoid substantial costs to rehabilitate this dam, it is recommended that the dam dam be breached. A program of annual periodic technical inspections should be instituted.

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REFERENCE OR OFFICE SYMBOL	SUBJECT
NEDED-E	Dam Inspection Final Report

TO | FROM | DATE 27 Apr 1978 | CMT 1

Chief, Design Branch
Chief, F & M Branch
Chief, Water Control Branch

Chairman,
Dam Safety Review Board

1. Attached is a single copy of the final report for Montpelier No. 4 Dam, Identity No. VT00048.

2. Please ascertain that the report is acceptable in accordance with your Branch comments or instructions given to the Architect-Engineer at the Review Board Meeting.

3. If acceptable, retain the copy for your files and be prepared to sign the (master) approval sheet on 4 May.

4. If the report requires further work or correction, notify the undersigned as soon as the determination is made.

5. The cost code for this review is ABA0 60700000000.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

JUN 1 0 1975

Honorable Richard A. Snelling
Governor of the State of Vermont
State Capitol
Montpelier, Vermont 05602

Dear Governor Snelling:

I am forwarding to you a copy of the Montpelier No. 4 Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Water Resources, the cooperating agency for the State of Vermont. In addition, a copy of the report has also been furnished the owner, Green Mountain Power Corporation, Montpelier, Vermont 05602.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Water Resources for your cooperation in carrying out this program.

Sincerely yours,

[illegible]
[illegible]

[illegible]
[illegible]
Division Engineer

MONTPELIER NO. 4 DAM

VT. 00048

EAST MONTPELIER, VERMONT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PORGRAM

PHASE I INSPECTION REPORT

Identification No:	VT 00048
Name of Dam:	Montpelier No. 4
Town:	East Montpelier
County and State:	Washington County, Vermont
Stream:	Winooski River
Date of Inspection:	November 21, 1978

BRIEF ASSESSMENT

This dam is a concrete gravity dam with an overall length of 152 feet, a basal spillway width at the concrete/bedrock interface at the gate house abutment of 11 feet and a structural height of 21 feet. This dam was constructed by Cory, Devitt and Frost, Inc. for the former Montpelier and Barre Light and Power Company. At the right abutment there is a concrete structure housing the forebay and gates. This structure formerly diverted water to a penstock for use at a downstream power house. Green Mountain Power Corporation now owns the facility; however, its function as a low-head hydroelectric facility was discontinued around 1960.

The dam is classified as small and has a low hazard potential in the event of dam failure. The dam is designed to overtop continuously without structural damage. The dam is anchored directly into existing channel bedrock. The gate house formerly abutted the downstream portion of a bend in the river. This bend was overtopped by river flows, partially eroded away, and subsequently backfilled with soil fines to construct the present access road.

Based on size and hazard classification and in accordance with Corps Guidelines, the test flood is the 100-year flood. The test flood outflow of 17,000 CFS (85 CSM) overtops the dam by 9.1 feet. With water level at the top of the dam (elevation 616.2 feet MSL) the spillway will pass 8,700 CFS which is 50 percent of the test flood.

The dam is in poor condition. The lack of maintenance during the last 15-20 years may have rendered the dam economically unsalvageable. The downstream portion of the soils to the right of the gate house appear to be highly susceptible to erosion, and the upstream portion is of unknown composition. In addition, the concrete overflow weir may be unstable against overturning and horizontal sliding under high water conditions, particularly since silt behind the weir practically reaches to its crest. To avoid substantial costs to rehabilitate this dam, it is recommended that the dam be breached. Alternatively, the stability of the dam and the right abutment must be checked in detail. The following items require immediate attention:

1. The waste gate and penstock gates should be opened permanently to maintain lower upstream water levels during normal flows. Prior to opening either gate, the Vermont Division of Water Resources should be contacted to specify necessary measures to control the release of silt build-up.

2. The forebay cover should be renovated to prevent unauthorized access and hazard to trespassers.

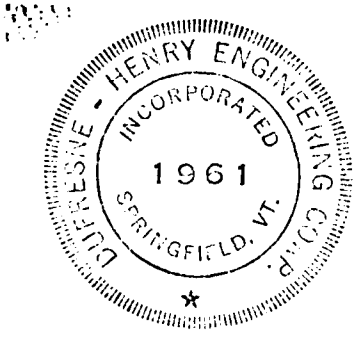
3. The gate house should be disassembled and removed from the site.

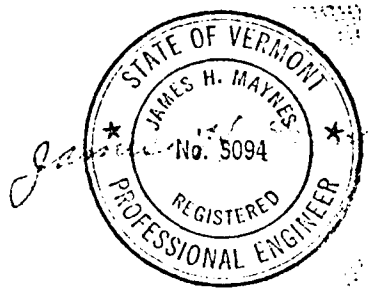
4. The trees that are growing on the embankment to the right and upstream from the gate house should be cut annually.

5. The downstream slope of the embankment to the right of the gate house should be kept free of debris and trees so that any seepage through the embankment will be observable.

6. All deteriorated concrete at the dam and abutments must either be repaired or replaced if the dam is to remain in use.

7. A program of annual periodic technical inspections should be instituted.





This Phase I Inspection Report on Montpelier Number Four has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Joseph W. Finegan

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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d. Reservoir Area

The reservoir area consists of approximately 4 acres when the water level is at spillway crest elevation, 610.6 feet MSL. This area was 7 acres in 1910 and has decreased due to heavy siltation.

e. Downstream Channel

The downstream channel is in good condition. There is very little debris or overhanging vegetation in or near the channel. There are several homes on the left side of the channel; however these homes are located above flood hazard levels. U.S. Route 2 crosses the Winooski River approximately 1 mile east of the dam, prior to the confluence of the Winooski River and Stevens Brook.

3.2 Evaluation

Montpelier No. 4 Dam has gradually deteriorated to a point such that renovation is not considered reasonable. The concrete has so severely spalled and cracked that actual replacement of the entire gate house and foundation would be necessary. Years without maintenance have rendered both the gate house and forebay cover unsalvageable.

The sluice gates and conduit equipment at the dam itself are no longer operable. The two sluice gates are not only inoperable but also beyond the point of repair. The penstock itself has been severed at the right abutment and has been completely removed downstream of the dam.

Based on the condition of the dam and the right abutment, it appears that this structure may be on the verge of incipient failure. However, the potential for destruction is extremely low due to the small volume of water behind the dam relative to the size of the downstream channel.

Based on the visual observations and the verbal information provided, it appears that the right abutment of this dam is uncompacted silt and trash fill that was not built as a dam but only as a road to access the gate house. Furthermore, no information is available on the character of the natural materials upstream from this access road. Therefore, it is not known whether these materials form an adequate dam. If the river overtops the right abutment again, it should be assumed that a washout will occur.

The left abutment of the dam appears to be composed of bedrock which appears to be competent.

the downstream side of the bend and worked upstream toward the headwater of the ice jam. Apparently a channel was not formed through the entire abutment. It is not known whether the upstream portion of the bend is controlled by a shallow ledge, or whether the water did not flow over the top long enough to cut all the way through.

At the time of inspection an embankment about 100 feet long at elevation 618.2 feet MSL existed between the gate house and the natural hill further to the right. The exposed portion of the downstream face of this embankment is composed of silt, fine sand and trash. The zone downstream from this embankment has been used for dumping trash. The surfaces of the embankment are generally grassed or forested. The shortest distance from the downstream crestline of this embankment to the upstream crestline (i.e. the top of the river bank on the upstream side of the dam) was about 200 feet at the time of inspection.

The material downstream of the left abutment also has been eroded during a previous overtopping. However, since this wall was anchored directly to bedrock, the eroded material was not required for support of the dam or abutment.

c. Appurtenant Structures

The discharge channel immediately downstream of the dam has exposed bedrock at both left and right banks. The channel has a cobble bottom and is clear and unobstructed.

The dam, constructed as a "run-of-the-river dam" has no intake channel. However, the quiescent conditions of the impoundment have allowed significant siltation to occur upstream of the dam. This siltation has severely limited both the maximum usable volume and surface area of the impoundment.

The intake channel into the forebay has significant silt deposits upstream from the bar racks. This silt has deposited upstream of the waste gate to a level near the top of the gate. The waste gate seemed to be nearly watertight. However, flow channels have developed in the waste gate discharge passageway as recorded in Photo 8 in Appendix C.

There is a flow of 10-20 GPM passing through the penstock sluice gate. This flow is recorded in Photo 7, Appendix C.

The forebay was covered, which prevented visual inspection.

The wood frame control building has deteriorated significantly. Its concrete footing serving as part of the dam is spalled and cracked beyond economical repair.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General

In general, the Montpelier No. 4 Dam is in very poor condition. The concrete has spalled severely both on the dam and abutment structures. In 1949, Stephen H. Haybrook, hydraulic engineer, noted that "surface disintegration has reduced its section and is further reducing the structure to incipient failure." The dam has weathered an additional 30 years with no apparent maintenance since that evaluation.

b. Dam

The dam consists of a concrete overflow spillway. On the day of inspection the water surface was slightly above the spillway crest (elevation 610.2 feet MSL). The downstream face of the dam has weathered significantly (see Photo 6, Appendix C). The concrete overflow spillway and gate house structure have been anchored directly to the bedrock existing throughout the entire length of the flow channel. Inspection for possible seeps at the base of the dam was not possible due to the continuous overflow. However, there was no visible seepage at the bedrock-concrete interface at the left or right abutment walls.

A wet area was observed to the extreme right of the dam. A stream carrying less than 3 GPM collects flow and rejoins the Winooski River channel downstream of the dam. It is not known whether this water is seepage through the embankment from the river, or runoff and ground water from the adjacent natural land. The water in this stream is discolored with a rusty stain on the downstream end, and is relatively stagnant on the upstream end.

There has been extensive fill (sandy silt with wood trash) placed upstream of the wet area to the right of the dam. This fill seems to have been placed to repair the access road which was eroded during a previous overtopping.

Mr. Raymond C. DeForge, Vice President of Operations and Engineering, Green Mountain Power Corporation, has indicated that the natural materials in the abutments have been overtopped in the past due to an ice jam upstream from the dam.

As a result of that overtopping the soil that comprised the right abutment, which is the mass that forms the bend in the river at this location, was eroded away. Erosion started on

2.3 Operation Data

The dam was attended during the period of time it was in operation as a low-head hydro facility (1908-1960). During the last 20 years there has not been any program of operation in effect at Montpelier No. 4 Dam.

2.4 Evaluation of Data

a. Availability

The original power license application plans for Montpelier No. 4 Dam are stored in the archives at the Montpelier office of the Green Mountain Power Corporation. There are no design calculations relating to structural or hydraulic aspects of the dam itself.

b. Adequacy

Based on the visual inspection and the available engineering data (Figures 1 and 2, Appendix B), the information is sufficient for the Phase I inspection.

c. Validity

The available engineering data are considered valid on the basis of the visual inspection.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

There are no design drawings or calculations available other than the "as built" drawings included in Appendix B, Figures 1 and 2. These drawings were part of the Green Mountain Power Corporation license application dated June 30, 1966.

A letter report, prepared in 1949 by Stephen H. Haybrook, contains a complete evaluation of the dam at that time. This report made reference to a report by Barker and Wheeler prepared in 1926. This report was not available for evaluation.

2.2 Construction Data

The dam was constructed in 1908 by Cory, Devitt and Frost, Inc. According to Green Mountain Power Corporation there has been little or no maintenance work on either the dam or related structures since construction.

There is no evidence of the dam being raised from its initial constructed elevation of approximately 610.2 feet MSL.

The concrete dam has been anchored into the existing bedrock as shown in Appendix B, Figure 2. In cross section, the concrete dam has faces symmetrical about the centerline and formed at an average slope of 4H:21V. There are flashboard support holes set into the crest of the dam at 15-foot intervals. The flashboards and supports are no longer in place.

The gate house footing and concrete penstock intake structure rest directly on the bedrock. A concrete training wall extends upstream about 75 feet from the gate house. This wall is shown in Appendix B, Figure 2, as not extending into bedrock.

The covering of the forebay is of wood construction with a tarpaper covering. The gatehouse is a single story wood frame building located directly over the air and gate shafts.

The 7-foot diameter steel penstock passing under the right end of the dam forms the forebay outlet and is hydraulically controlled by a sluice gate located at the penstock intake.

Also passing through the right end of the dam is a waste gate discharge passageway. This outlet is controlled at the upstream end by a wooden sluice gate. This structure provides a method of draining the impoundment for maintenance procedures.

(5) Side Slope

Upstream - approximately 4H:21V.

Downstream - approximately 4H:21V.

(6) Zoning

Not applicable.

(7) Impervious Core

Not applicable.

(8) Cutoff

Concrete to bedrock of stream channel.

(9) Grout Curtain

None known.

(10) Other

No other aspects known.

h. Diversion and Regulating Tunnel

Not applicable.

i. Spillway

The spillway consists of a modified ogee spillway 152 feet in length. The crest of the weir is about 3 feet wide and its upstream and downstream faces are sloped at about 4H:21V. The spillway is anchored directly into bedrock. The maximum height of the structure is about 21 feet.

j. Regulating Structures

The water level can be affected by opening or closing either the waste gate or penstock intake gate. Otherwise the impoundment level remains at or above the spillway crest elevation of 610.2 feet above MSL. Both gates are controlled by wooden sluice gates, now inoperable. The invert elevation of the 7' x 10' waste gate passageway is 592 feet MSL. The 7-foot diameter penstock also has an invert elevation of 592.0 feet MSL.

		Elevation (feet above MSL)
	Spillway Crest	610.2
	Normal Pool	610.4
	Upstream Invert of Waste Gate Passageway	592
	Streambed at Centerline of Dam	592
d.	Reservoir Dam	Feet
	Length of Test Flood Pool	1000
	Length of Normal Pool	1000
e.	Storage Data	Acre-Feet
	Test Flood (100-year)	51.6
	Top of Dam (at left abutment)	39.2
	Normal Pool	16
f.	Reservoir Surface Area	Acres
	Test Flood (100-year)	4
	Top of Dam (at left abutment)	4
	Normal Pool	4

g. Dam

(1) Type

The dam is a concrete gravity dam.

(2) Length

The overall length is about 227 feet; the weir length is 152 feet.

(3) Height

The maximum height is 26.2 feet.

(4) Top Width

A level section through the top of the rounded weir is about 3 feet.

waste gate passageway is a 10' x 7' outlet controlled by a sluice gate which is presently inoperable. The intake into the forebay is controlled by another sluice gate. Invert elevations for both conduits are at approximately 592.25 feet MSL. Silt has essentially clogged the upstream side of these gates.

(2) Maximum Known Flood at Dam Site

There are no records available regarding major flooding at the dam site. Green Mountain Power Corporation personnel indicate that ice jams at the dam cause a much higher water level than a 100-year frequency flood.

(3) Spillway Capacity

The capacity of the spillway at elevation 618.2 feet MSL is about 13,400 CFS.

(4) Ungated Spillway Capacity During Test Flood

The ungated spillway capacity at the 100-year test flood elevation 619.3 feet MSL is approximately 16,000 CFS.

(5) Gated Spillway Capacity at Normal Pool Elevation

Not applicable.

(6) Gated Spillway Capacity at Test Flood Elevation

Not applicable.

(7) Total Spillway Capacity at Test Flood Elevation

16,000 CFS at elevation 619.3 feet MSL.

(8) Total Project Discharge at Test Flood Elevation

17,000 CFS at 619.3 elevation.

c. Elevation Data

	Elevation (feet above MSL)
Top of Dam (Maximum) (at gatehouse and access road)	618.2
Top of Dam (Minimum) (at left abutment)	616.2
Top of Flashboards (no longer used)	612.7
Test Flood (100-year)	619.3

g. Purpose of Dam

The dam was designed solely to provide an intake basin from which water could be withdrawn and transported to a power generation station located downstream. The impounded water entered the forebay through a bar rack structure and passed to a 7-foot diameter penstock. The penstock carried water approximately 0.53 miles westerly along the river to the Number 4 power station.

h. Design and Construction History

The dam was constructed in 1908 by Cory, Devitt and Frost, Inc. Design records are not available. There are two plans prepared for Federal Power Commission licensing available which seem to be in agreement with observations made during the visual inspection.

i. Normal Operational Procedures

The dam has not been operated during the past 15 years.

1.3 Pertinent Data

a. Drainage Area

The drainage area at the Montpelier No. 4 Dam is 201 square miles. The flow at this site is regulated by Peacham Pond and Mollys Falls Reservoir (combined usable capacity 11,295 acre-feet). The Winooski River is located in the central portion of the physiographic region of Vermont known as the Vermont Piedmont. The river flows westerly into Lake Champlain and has an average slope upstream of the site of 13 feet per mile. The soils within the watershed are predominantly well drained loamy silty soils on gently sloping to steep hills.

The river channel in the vicinity of the dam is principally a calcareous sandstone known as the Waites Formation. Exposures of a nearly-vertically foliated graphitic phyllite and pegmatite intrusions are both present in the vicinity. The upstream side of the bend in the river that forms the right abutment of the dam is composed of glacial till. The thickness of this till is not known.

b. Discharge at Dam Site

(1) Outlet Works

The spillway is designed for continuous overtopping and thus provides the major outlet at Montpelier No. 4. In addition, there have been two other structures designed into the dam to function as outlets. The waste gate and

b. Description of Dam and Appurtenances

The Montpelier No. 4 Dam is a concrete gravity dam with an overall length of 152 feet, a basal spillway width of 11 feet and a structural height of 21 feet.

The modified ogee spillway is anchored directly into the channel bedrock. The left abutment is bedrock and the right abutment consists of soil.

There are two low level outlets built into the dam, both controlled by wooden sluice gates. The waste gate passageway is a 10' x 7' outlet at invert elevation 592.25 feet MSL. The other outlet conduit was initially designed as the 7-foot diameter penstock intake at invert elevation 592.00 feet MSL. The penstock has been severed at the downstream gate house abutment.

The downstream channel is clear of debris and overhanging forestation and slopes at approximately 3 feet per 1000 feet.

c. Size Classification

The Montpelier No. 4 Dam has a size classification of small. The dam impounds about 700,000 cubic feet (16 acre-feet) at a normal water surface of 610.4 feet MSL. The storage with a water surface at the top of the dam (elevation 618.25) is about 48 acre-feet. A dam with a maximum storage volume of less than 1000 acre-feet or a height of greater than 25 feet but less than 40 feet is classified as small. In this case both criteria apply.

d. Hazard Classification

The potential for hazard in the event of failure of this dam is low. Homes in the area affected are above the flood wave.

e. Ownership

The dam is owned by the Green Mountain Power Corporation, Montpelier, Vermont.

f. Operator

Montpelier No. 4 Dam has no one individual responsible for the day-to-day operation of the facility. Questions regarding operational procedures should be addressed to Green Mountain Power Corporation, telephone 802-223-5235.

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
NAME OF DAM: MONTPELIER NO. 4

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Dufresne-Henry Engineering Corporation has been retained by the New England Division to inspect and report on selected dams in the State of Vermont. Authorization and notice to proceed were issued to Dufresne-Henry Engineering Corporation under a letter of November 20, 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0010 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by nonfederal interests.

(2) Encourage and prepare the states to initiate quickly effective dam safety programs for nonfederal dams.

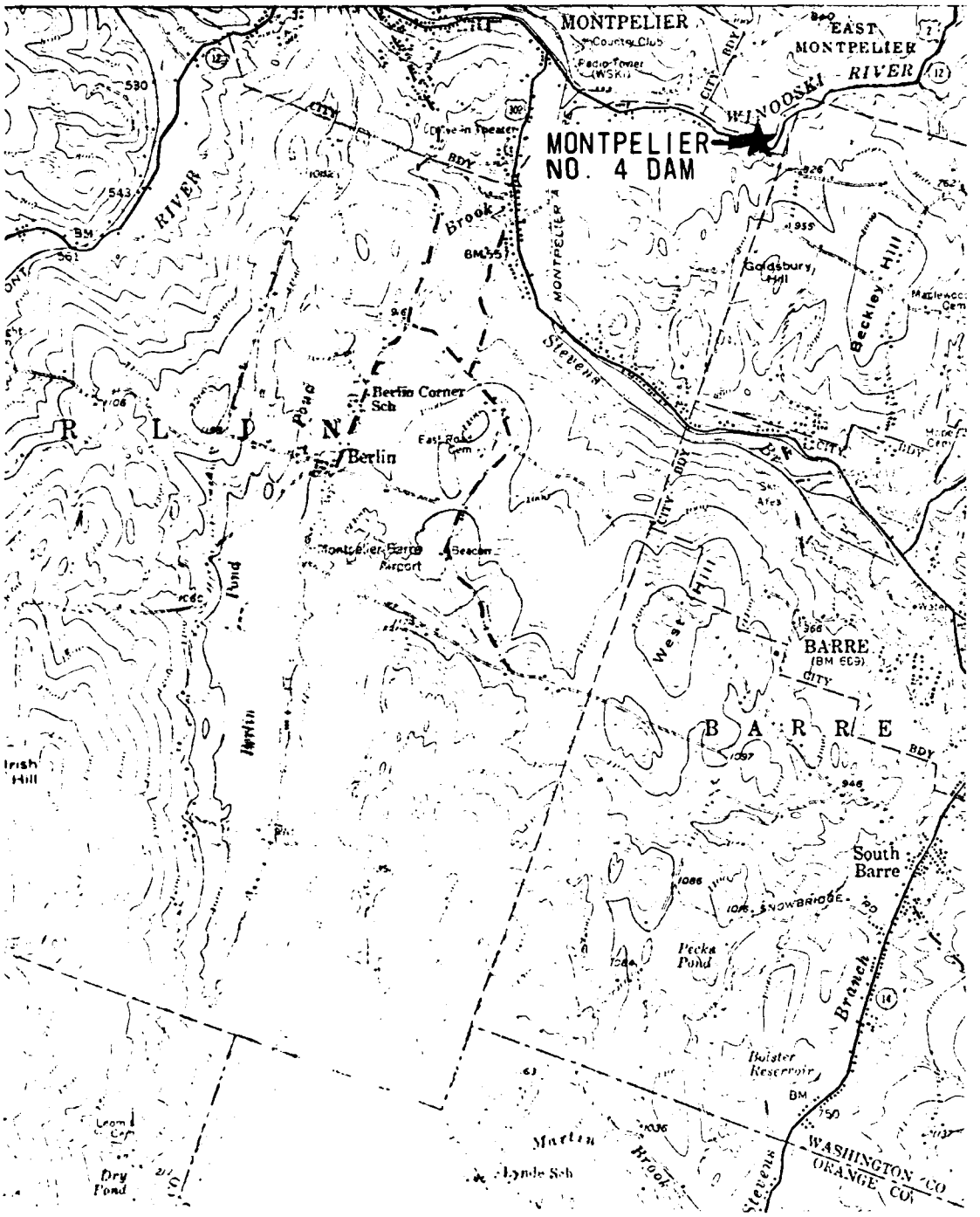
(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

Montpelier No. 4 Dam is located partially in the Towns of Berlin and East Montpelier, Washington County, Vermont.

The site is located on the Winooski River which empties into Lake Champlain and is approximately 7,400 feet upstream from the confluence of the Winooski River and Stevens Brook.



DUFRESNE-HENRY ENGINEERING CORP. ARCHITECT-ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION MAP
MONTPELIER NO.4 DAM

SOURCE:
USGS QUADRANGLE
"BARRE" 1922-57
1:62.500

EAST MONTPELIER			VERMONT
CLIENT NO.	04-0096		SCALE 1"=1 MILE
ENGR.	RED		DATE DECEMBER 19, 1978

OVERVIEW OF
MONTPELIER NO. 4 DAM
EAST MONTPELIER, VERMONT

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

The dam has not been operated for the past 15 to 20 years.

4.2 Maintenance of the Dam

During the time of operation, routine maintenance was necessary to remain economical as a low-head hydro intake facility. However, during the past 15-20 years the dam has not been used and therefore not maintained.

4.3 Maintenance of the Operating Facilities

There is no maintenance provided.

4.4 Description of any Warning System in Effect

There is no warning system in effect.

4.5 Evaluation

There have been little or no operation or maintenance procedures during the past 15-20 years.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General

The Montpelier No. 4 Dam is a concrete gravity dam of the run of the river type. It is basically a low surcharge storage-high spillage dam designed for continual overtopping.

b. Design Data

No design data for the structures at Montpelier No. 4 are available.

c. Experience Data

There is no written record of overtopping at Montpelier No. 4. It experienced the November 1927 flood without significant damage even though Montpelier No. 5 upstream of this site was severely damaged during the flood. There is some possibility that Mollys Falls Reservoir moderated the peak flow, but hydrologic analyses indicate that the dam must have been overtopped in 1927.

Green Mountain Power Company representatives indicate that an ice jam occurred in the mid-1930s which caused the overtopping that eroded substantial portions of the embankment on the right abutment. There are also positive signs of overtopping on the left abutment. This may have occurred either in 1927 or probably 1936.

d. Visual Observations

The continual overtopping of the Montpelier No. 4 Dam may continue for many years without failure. However, the flow channels through the concrete dam indicate significant internal deterioration. Spalling on the downstream side of the spillway has significantly reduced the effective dam section. The deteriorated condition of the concrete coupled with inadequate earthen dike on the right upstream river bank render the future of Montpelier No. 4 Dam precarious.

e. Test Flood Analysis

The test flood was selected as the 100-year flood using data provided by a Flood Insurance Study prepared by the Federal Insurance Administration by the New York District, Corps of Engineers in May 1975. The 100-year flood at the dam site is approximately 17,000 CFS (85 CSM) and under this condition the dam would be surcharged by 9.1 feet of water. This flow was not adjusted for surcharge storage as this is a run-of-the-river impoundment with low storage capacity.

f. Dam Failure Analysis

Under normal conditions, if the Montpelier No. 4 Dam were to fail due to the excessive deterioration of the concrete, a section approximately 20 feet wide near the spillway would fail first. This failure would release approximately 3500 CFS of water. Under the test flood conditions, if the dam were to fail approximately 5800 CFS additional flow would be released. Under these same conditions, if the dam held and the earthen dike on the right bank were to fail, 2600 CFS of water would escape. However, regardless of failure of either structure during the test flood, the City of Montpelier for the 100-year flood would already be under water. Therefore, the failure of either the dam or the erosion of the dike would have minimal additional impact on the City of Montpelier. Failure of either a 20-foot section of the concrete spillway or 60 feet of the earth embankment will cause a 1-foot or less rise in the 100-year flood level along the Winooski River upstream of the North Branch-Winooski River.

Sixty (60) feet of the concrete spillway failing with normal water levels would release a peak rate of 10,540 CFS and releasing 16 acre-feet of impounded water. This would create a wave of water about 9 feet high based on section backwater at the site. At this depth the Winooski River impounds about 20 acre-feet over an 845-foot reach. This impoundment capacity along the reach of the river would rapidly reduce the flood wave so that it would not overtop the river banks which are generally 15 feet or more above the stream bed.

For the water to be at the top of dam, elevation 618.2, the Winooski River would have to be discharging approximately 13,400 CFS. A 60-foot breach forming in the dam with water at this stage would release an additional 8,300 CFS for a total flow in the river of 21,700 CFS at the instant of failure. The surcharge storage lost as a result of this breach would be about 36 acre-feet. From rating curves plotted for cross sections 67 and 68 of the Winooski River near the Montpelier City line, there is 12 acre-feet of active storage available per 845-foot reach length to attenuate this additional flood flow resulting from the breach formation. From flood routing, this peak will decay approximately 30 percent per 845 foot reach so that there will be little difference between the flood stages for the flood before and after the case of the dam failing with the water level at the top of dam. In the first 3000-foot reach of the river where most of the flood attenuation takes place the flood will be within the river banks inundating an area not to exceed 300 feet in width.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The visual inspection did not disclose any findings which would indicate instability of the foundation of the structures.

b. Design and Construction Data

The available design and construction data are insufficient to formally evaluate the stability of the dam. However, the height of the concrete weir is known at two cross sections, as shown on Exhibit L of the Green Mountain Power license application dated June 30, 1966. At the higher of these two cross sections the weir is about 20 feet high from crest to bedrock along the centerline. In the field it was observed that the upstream side of the weir has been filled in with river silt almost up to the crest, in the vicinity of the right end of the weir. Further, Mr. DeForge of Green Mountain Power Corporation has indicated that overtopping of the right abutment has occurred, which means that the water level has been at least 10 feet above the crest of the weir.

Given the cross sections of the weir as shown on Exhibit L and the above loading conditions, and further assuming that the tailwater is 10 feet above the base, the stability of the weir against overturning and horizontal sliding is questionable. Therefore, it is important that the stability of this weir be evaluated in detail if the dam will continue to impound water.

c. Operating Records

None of the available records indicate that foundation stability problems have developed since the dam was constructed in 1908.

d. Post-Construction Changes

There are no known post-construction changes with the exception of the access road reconstruction and the silting-in behind the spillway weir which were mentioned previously in Sections 6.1b and 3.1 b and c.

e. Seismic Stability

The dam is in Seismic Zone 2 and in accordance with recommended Phase I guidelines does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/ REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

This dam is considered to be in poor condition because the character of the materials in the embankment to the right of the gate house are in part susceptible to internal erosion and in part unknown. Also, the combination of a heavy silt load on the upstream side of the spillway and high water levels that apparently have been reached in the past indicate that the stability of this weir against overturning and horizontal sliding is questionable.

The actual concrete in the dam and abutment structures has undergone significant deterioration. Abundant cracking and spalling are visible along most of the dam and right abutment. In addition, the internal concrete, visible inside the waste gate passageway, has developed flow channels (see Photo 8).

b. Adequacy of Information

The data available were sufficient to bring out potential defects in this structure but are not sufficient to evaluate the seriousness of those potential defects. The Phase I inspection was based principally on visual observations, verbal history and two drawings submitted in 1966 by Green Mountain Power for license application and engineering judgment.

c. Urgency

The recommendations given in Section 7.2 should be carried out within one year after receipt of this report.

d. Need for Additional Investigation

The additional investigations described in Section 7.2 should be carried out.

7.2 Recommendations

An engineer qualified in the design of dams should be engaged to:

1. Investigate the stability of the concrete overflow weir and make recommendations relative to the need for alterations.

2. Investigate the composition and stability, particularly against internal erosion, of the embankment to the right of the gate house, including the entire cross section upstream to the start of the bend in the river.

7.3 Remedial Measures

a. Operating and Maintenance Procedures

1. The waste gate and penstock gates should be opened permanently to maintain lower upstream water levels during normal flows. Prior to opening either gate, the Vermont Division of Water Resources should be contacted to specify necessary measures to control the release of silt build-up.

2. The forebay cover should be renovated to prevent unauthorized access and hazard to trespassers.

3. The gate house should be disassembled and removed from the site.

4. The trees that are growing on the embankment to the right and upstream from the gate house should be cut annually.

5. The downstream slope of the embankment to the right of the gate house should be kept free of debris and trees so that any seepage through the embankment will be observable.

6. All deteriorated concrete at the dam and abutments must either be repaired or replaced if the dam is to remain in use.

7. A program of annual periodic technical inspections should be instituted.

7.4 Alternatives

As an alternative to carrying out the recommendations in Section 7.2 above, the dam could be breached to eliminate any potential flood hazards of this dam. Hazards to trespassers should also be eliminated if the dam is breached. However, the dam's capacity to retain ice and prevent severe ice jams in the City of Montpelier should be evaluated before a decision is reached to breach the structure. In addition, the Vermont Division of Water Resources will require proper controls to prohibit the sudden release of siltation deposits downstream.

APPENDIX A

VISUAL INSPECTION CHECK LIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT MONTPELIER No. 4 DAM

DATE November 21, 1978

TIME 12:30

WEATHER 70 % cloudy, 30° F at 12:40

W.S. ELEV. ____ U.S. ____ DN.S.

PARTY:

1. James H. Maynes	D-H	6.	
2. Morris J. Root	D-H	7.	
3. Robert E. Dufresne	D-H	8.	
4. Steve J. Poulos	GEI	9.	
5. Kenneth Hadd	GMP	10.	

PROJECT FEATURE	INSPECTED BY	REMARKS
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

A-2

PERIODIC INSPECTION CHECK LIST

PROJECT Montpelier No. 4 Dam DATE November 21, 1978

PROJECT FEATURE NAME S. J. Poulos

DISCIPLINE Geotechnical NAME

AREA EVALUATED	CONDITION
DAM EMBANKMENT (Earth fill zone to right of right abutment)	
Crest Elevation	618.25 USGS
Current Pool Elevation	610.25 USGS
Maximum Impoundment to Date	Foundation of concrete dam-spillway is bedrock
Surface Cracks	None observed
Pavement Condition	None
Movement or Settlement of Crest	Not observable
Lateral Movement	Not observable
Vertical Alignment	Not observable
Horizontal Alignment	Not observable
Condition at Abutment and at Concrete Structures	Left abutment - over wash has scoured soil to bedrock on downstream side and has scoured rock. Right abutment - no seepage at concrete bedrock interface.
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Locked gate gives access. There seems to be no trespassing.
Sloughing or Erosion of Slopes or Abutments	During a past flood river has flowed over embankment to right of right abutment. Probably also dredge spoil has been placed to repair access road to gate house and to widen embankment. Fill is silt and miscellaneous wood trash.
Rock Slope Protection - Riprap Failures	Upstream face on right side is thick concrete wall; on left, channel is in bedrock.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	A small stream (<3GPM) is present downstream of right abutment contact with natural ground. Not known whether this is seepage from river or a natural stream. No other seepage observed downstream.
Piping or Boils	None observed.

A-3

PERIODIC INSPECTION CHECK LIST

PROJECT Montpelier No. 4 Dam DATE November 21, 1978

PROJECT FEATURE _____ NAME S. J. Poulos

DISCIPLINE Geotechnical NAME _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT (Earth fill zone to right of right abutment)	
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None
Vegetation	Fully forested with trees on downstream side up to about 16" diameter.

PERIODIC INSPECTION CHECK LIST

PROJECT Montpelier No. 4 Dam DATE November 21, 1978

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	The comments below refer to the intake channel just upstream from the gate house intake screens.
a. Approach Channel	
Slope Conditions	The intake screens are almost totally silted in with river silt that has deposited just upstream.
Bottom Conditions	Not visible.
Rock Slides or Falls	None
Log Boom	None
Debris	
Condition of Concrete Lining	None - river is approach
Drains or Weep Holes	None
b. Intake Structure	
Condition of Concrete	Poor - spalled and cracked
Stop Logs and Slots	Trash screen - covered by silt at intake to penstock. 1 - outlet - flood gate. 1 - outlet - penstock. 2 inlet screens.

PERIODIC INSPECTION CHECK LIST

PROJECT Montpelier No. 4 Dam DATE November 21, 1978

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	Poor - dangerous.
Condition of Joints	Too irregular to judge.
Spalling	Much visible evidence on all concrete structures.
Visible Reinforcing	Wire mesh only.
Rusting or Staining of Concrete	Along cracks.
Any seepage or Efflorescence	Some seepage in flood gate conduit through concrete.
Joint Alignment	Seems to be OK
Unusual Seepage or Leaks in Gate Chamber	Gates are closed tightly. Significant seepage through flow channels in penstock sluice gate.
Cracks	Several small cracks.
Rusting or Corrosion of Structural Steel	None.
b. Mechanical and Electrical	
Air Vents	None.
Float Wells	None.
Crane Hoist	None.
Elevator	None.
Hydraulic System	None.
Service Gates	1 - rack and pinion on flood gate (7' x 10')
	1 - gear and screw on penstock (7' diameter pipe) sluice gate
Emergency Gates	
Lightning Protection System	None.
Emergency Power System	None.
Wiring and Lighting System	None.

PERIODIC INSPECTION CHECK LIST

PROJECT Montpelier No. 4 Dam DATE November 21, 1978

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT - EMERGENCY FLOOD GATE	
General Condition of Concrete	Poor.
Rust or Staining on Concrete	Most of the concrete is stained.
Spalling	Large chunks falling off.
Erosion or Cavitation	Severe erosion.
Cracking	The concrete on all three outlet works sho prolific cracking.
Alignment of Monoliths	Too irregular to judge.
Alignment of Joints	Too irregular to judge.
Numbering of Monoliths	Too irregular to judge.

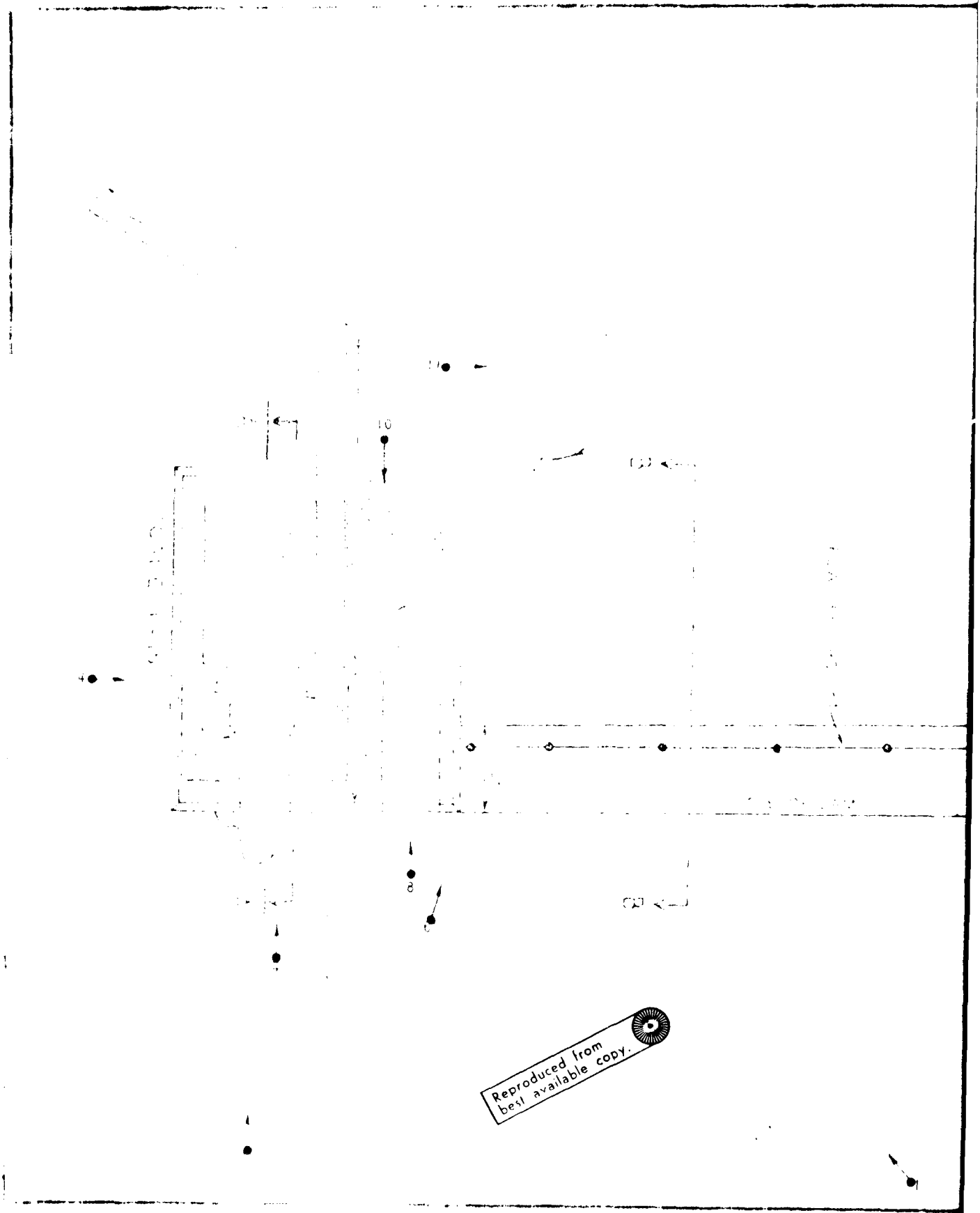
PERIODIC INSPECTION CHECK LIST

PROJECT Montpelier No. 4 Dam DATE November 21, 1978

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	See Conduit
Rust or Staining	" "
Spalling	" "
Erosion or Cavitation	" "
Visible Reinforcing	" "
Any Seepage or Efflorescence	" "
Condition at Joints	" "
Drain Holes	None
Channel	Natural bedrock.
Loose Rock or Trees Overhanging Channel	Plenty of loose rock and trees but form no impediments.
Condition of Discharge Channel	Hydraulically OK.



APPENDIX C

PHOTOGRAPHS AND LOCATION KEY

1. View of Gate House and Severed Penstock
2. View of Dam Spillway
3. View of Left Abutment and Dam Spillway
4. View of Right Side of Gate House
5. Downstream View of Gate House, Penstock and Waste Gate Passageway
6. View of Spalling at Right Downstream Abutment
7. View of Severed Penstock
8. View of Waste Gate Passageway
9. Downstream View of Left Abutment
10. View of Silt Deposit Upstream of Waste Gate
11. View of Bedrock on Left Side of Impoundment
12. View of Siltation on Right Side of Impoundment
13. View of Spillway Crest

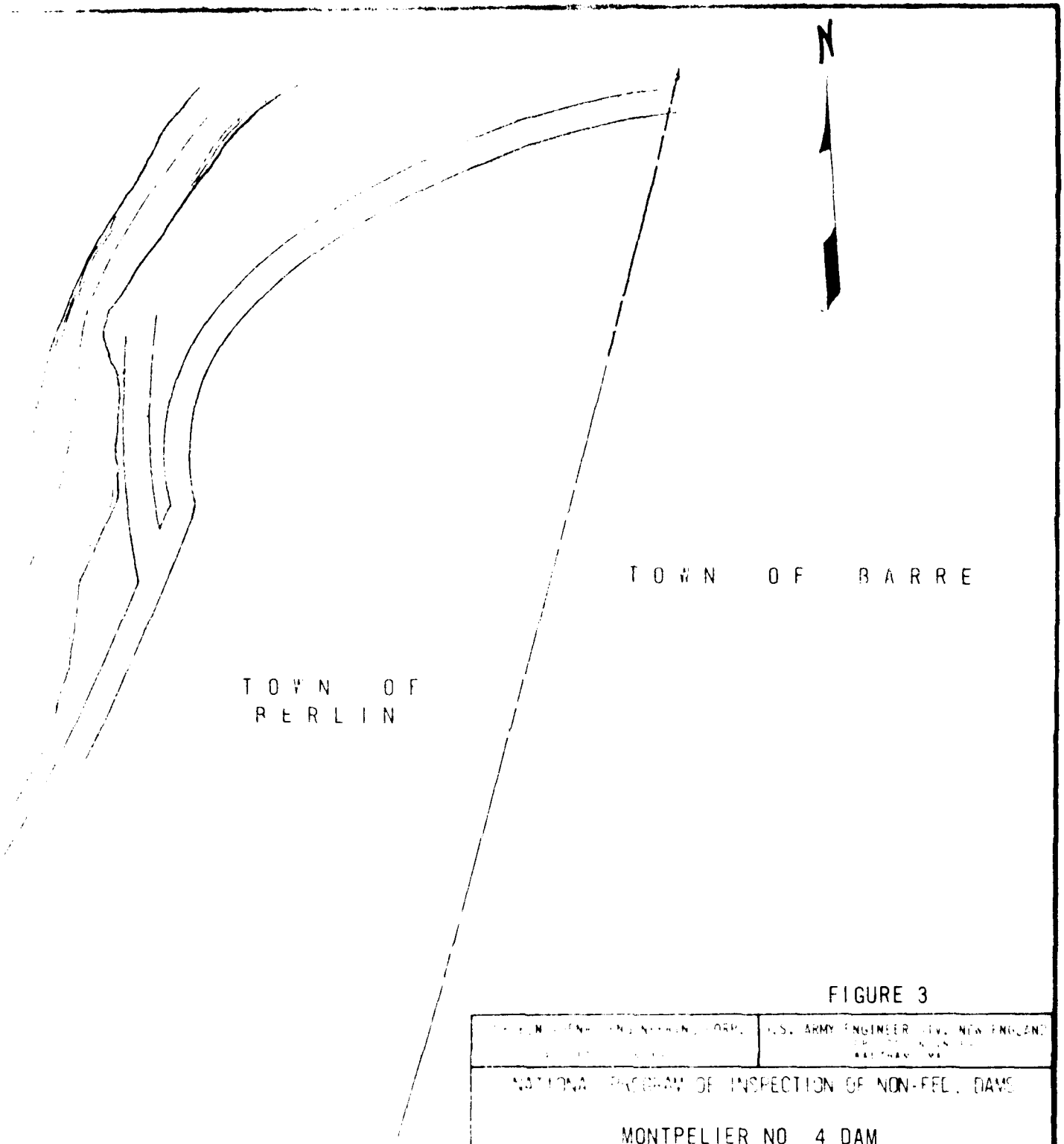


FIGURE 3

[illegible]	U.S. ARMY ENGINEER DIV. NEW ENGLAND [illegible]

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MONTPELIER NO 4 DAM

EAST MONTPELIER VERMONT

CLIENT NO.	54 0096	FROM FEAB K	SCALE 1" = 200'
ENGR	RED	GMPC	DATE 12-13-78

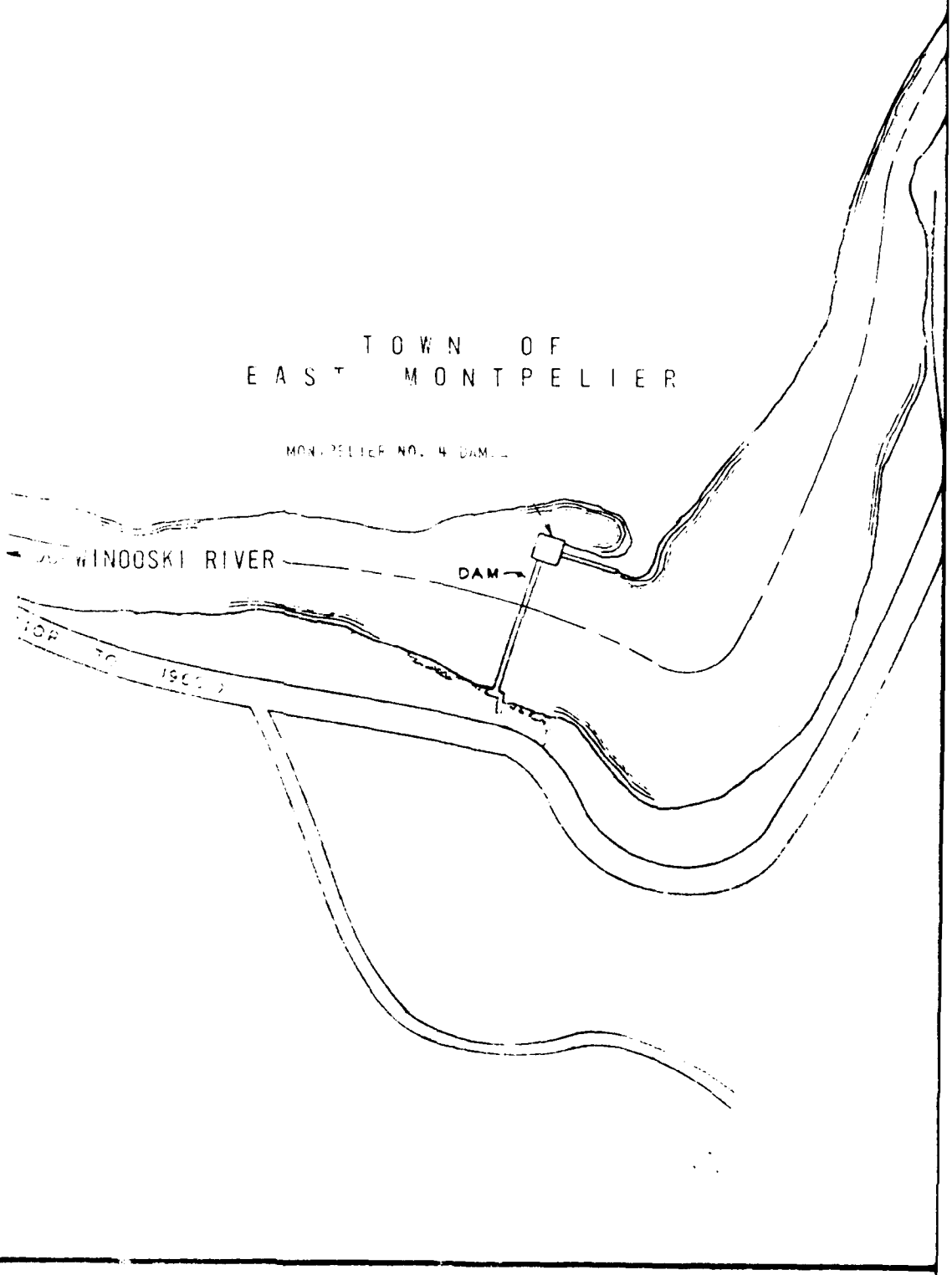
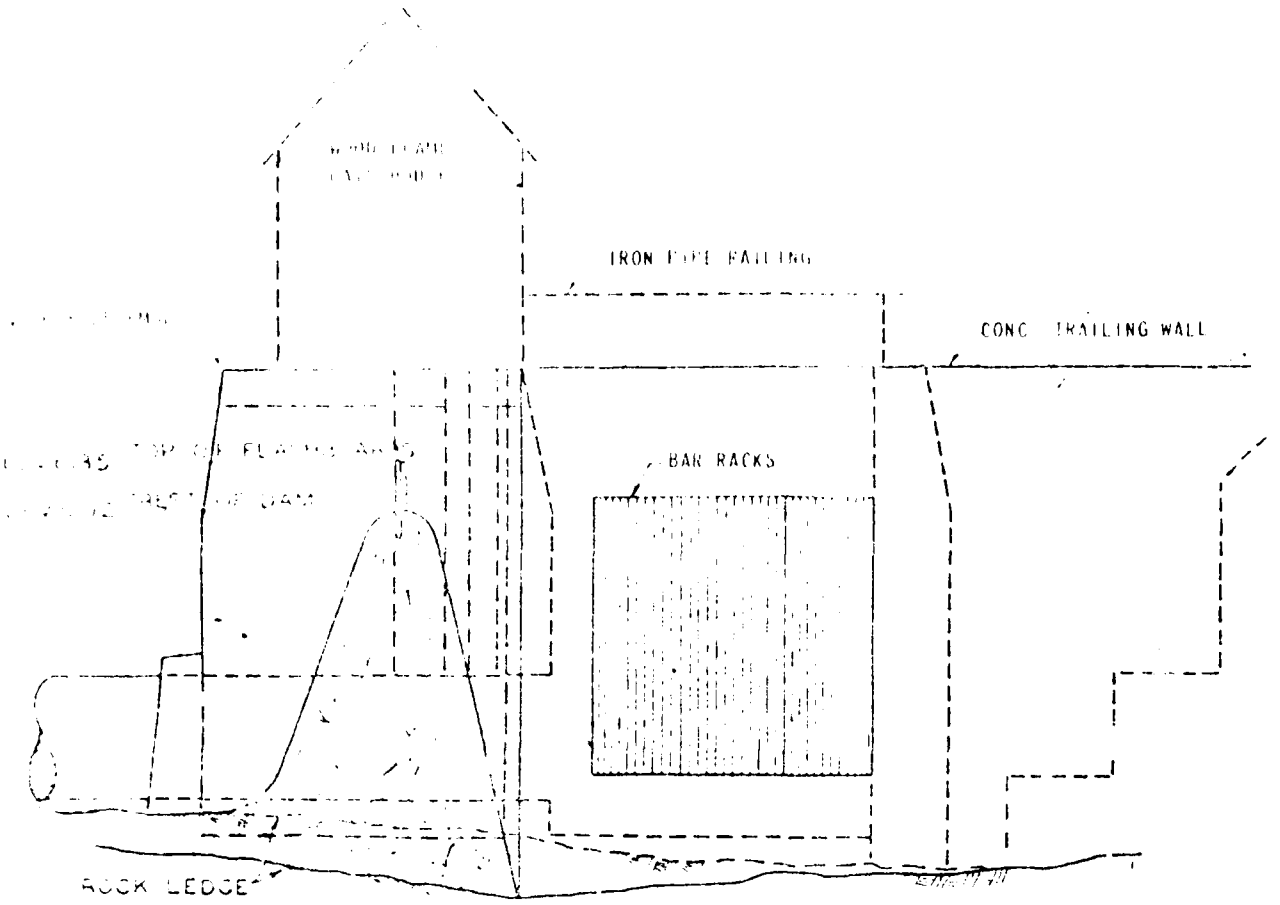

TOWN OF
EAST MONTPELIER
MONTPELIER NO. 4 DAM
WINOOSKI RIVER
DAM

FIG 3

1 of 2



SECTION B-B

SCALE: 1" = 10' APPROX

FIGURE 2

DUFRESNE-HENRY ENGINEERING CORP.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

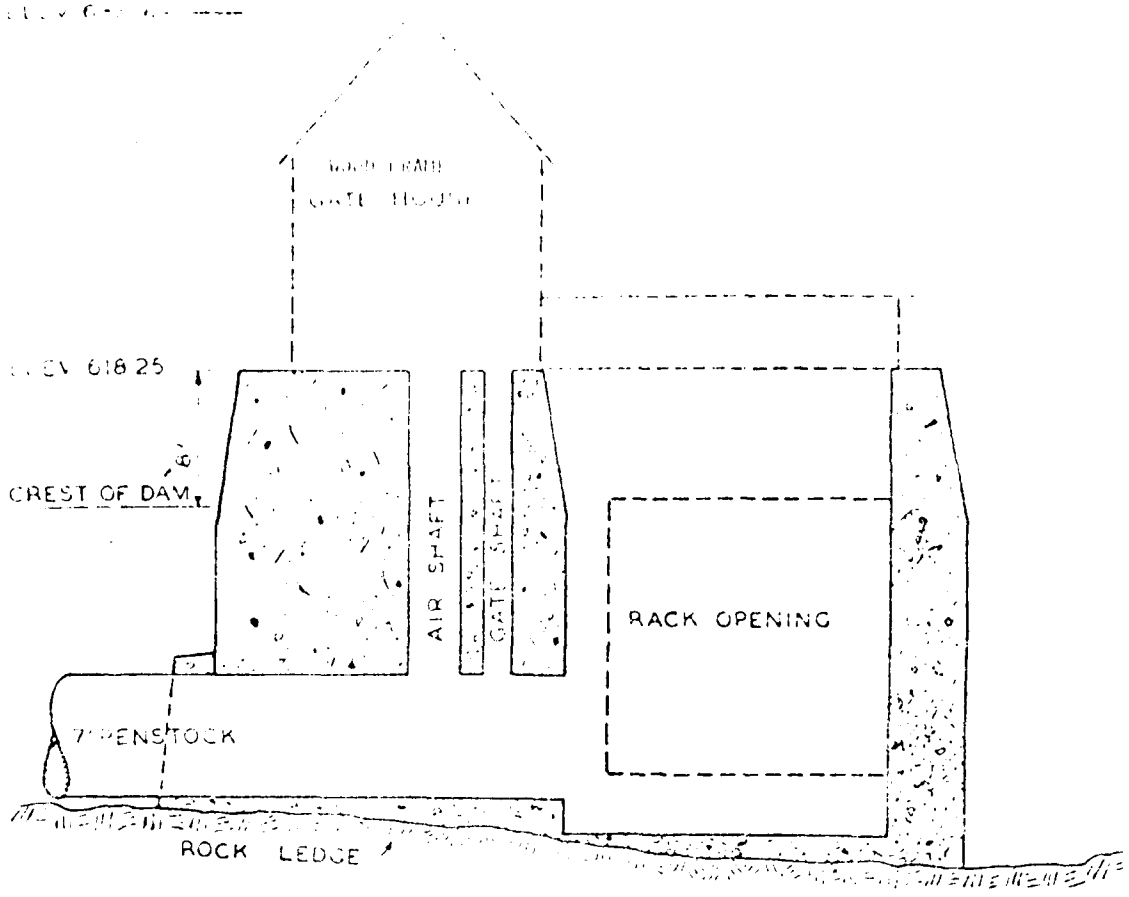
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MONTPELIER NO. 4 DAM

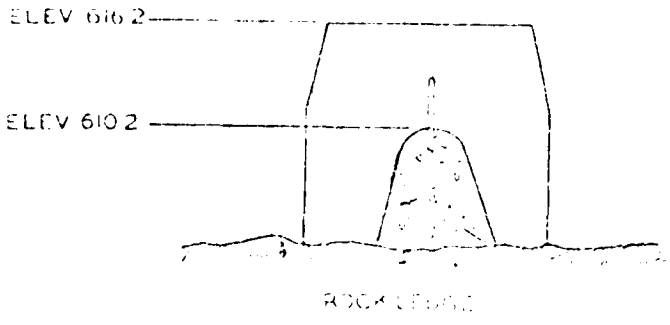
EAST MONTPELIER VERMONT

CLIENT NO.	04-0096	FROM: EXB.L	SCALE AS SHOWN
ENGR	RED	GMPC	DATE 12-19-78

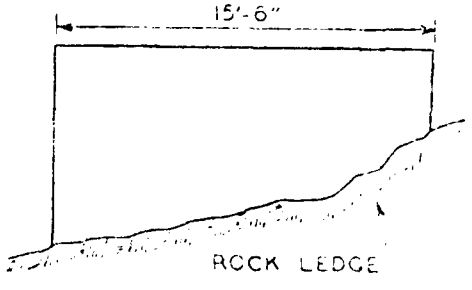
SEE FIGURE 1



SECTION A-A



SECTION C-C



SECTION D-D

N T S

NOTE: FOR PLAN SEE

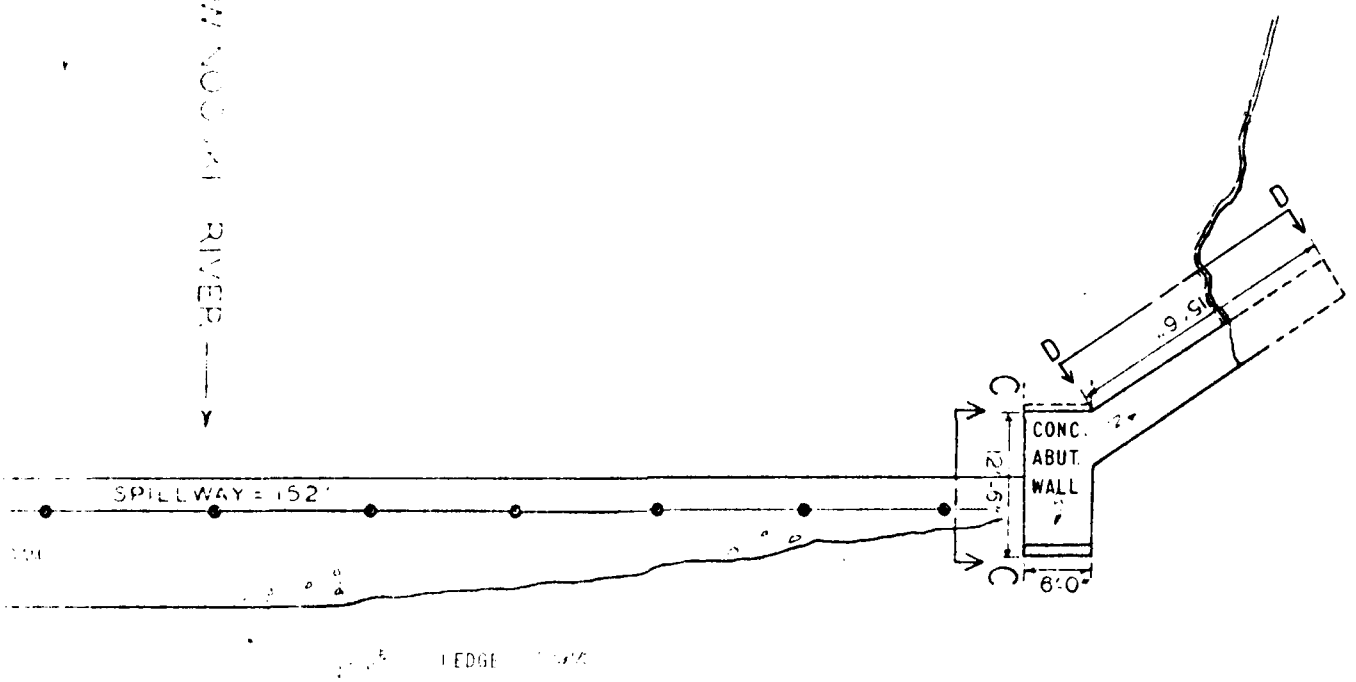


FIGURE 1

JAMES SNE-HENRY ENGINEERING CORP.	U.S. ARMY ENGINEER DIV. NEW ENGLAND

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

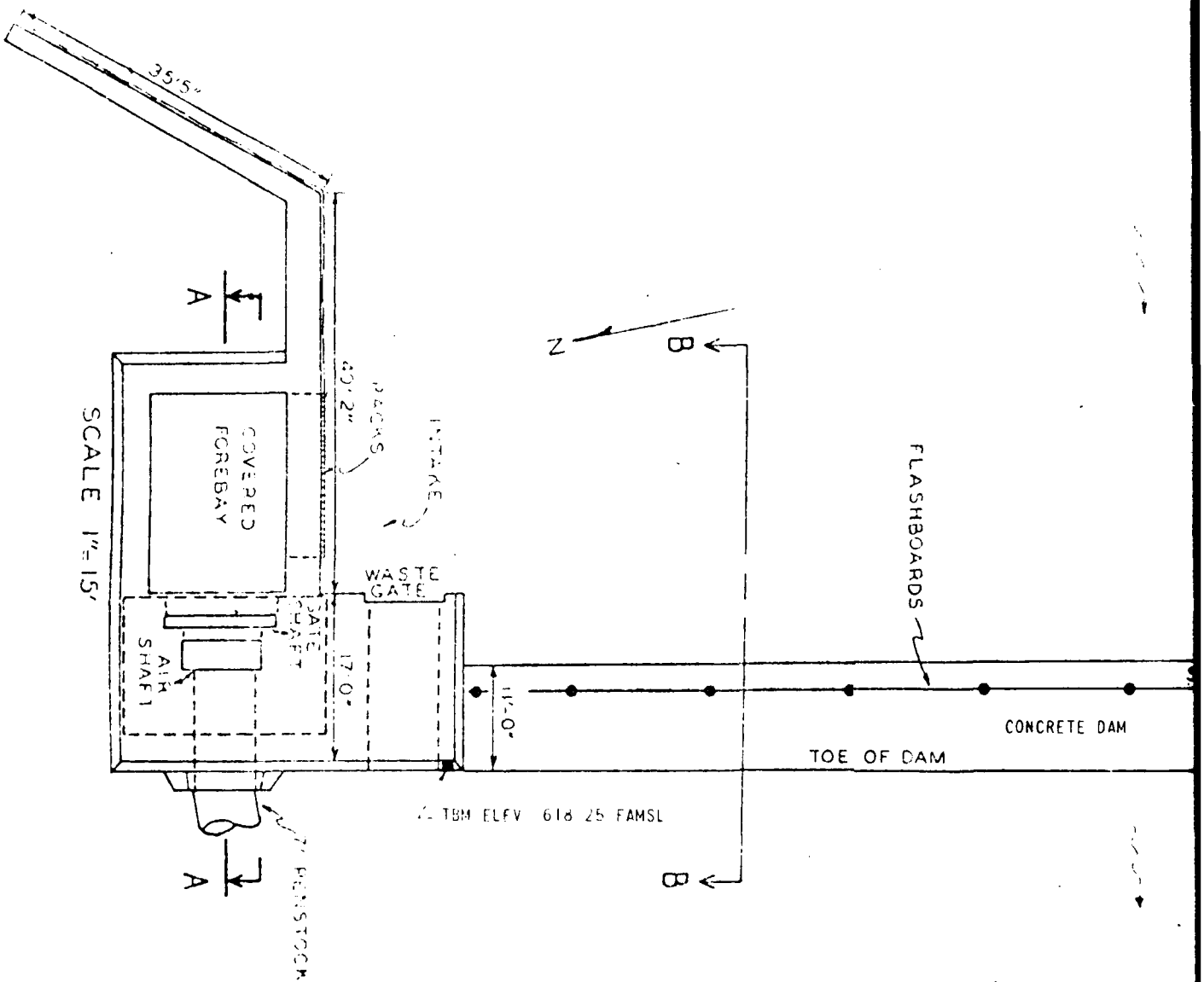
MONTPELIER NO. 4 DAM - PLAN

EAST MONTPELIER VERMONT

CLIENT NO. 04-0096	FROM: EXB L	SCALE	1" 15'
ENGR. RED	GMPC PLAN	DATE	12-19-78

FOR SECTIONS SEE FIGURE 2

3 of 3



NOTE: FOR SEC

FIG I

1 of 2

but for the existing weakened condtions undue damage to the structure is possible.

Conclusions:

According to the writer's observation of this dam, surface disintegration has reduced its section and is further reducing the structure to incipient failure. As indicated herein the intake section is in the poorest condition. Because of the small storage capacity, under ordinary conditions damage due to a dam failure would be limited.

Nevertheless, rehabilitation work is needed for this dam and should be accomplished soon.

STEPHEN H. HAYBROCK
HYDRAULIC ENGINEER

Public Service Commission
Montpelier, Vermont
December 9, 1949

Report No. 102

has sustained a surface failure, i. e., surface scaling and disintegration.

The spillway section, shown in Figure 1 has not been badly affected on its downstream face. The condition is more pronounced on the upstream face, especially at the upper elevation.

As shown in Figure 2, the intake section is in the worst condition. Besides the loss in section due to disintegration there is leakage in a number of places around its perimeter. Because of the leakage, alternate cycles of freezing and thawing can further disintegrate the concrete mass.

Miscellaneous Comments:

No major repairs have been made to this dam since its construction. Because of the almost complete silt conditions in the reservoir, the owner is skeptical about the relative worth of rehabilitating the structure.

In reviewing the discharge capacity of this dam it was found to be inadequate as far as the maximum probable flood is concerned. Ordinarily, the dam could stand some overtopping,

Denver, Co.

10/26/

REPORT ON MONTPELIER #4 DAM OF THE GREEN MOUNTAIN POWER CORPORATION

Introduction:

Montpelier #4 dam is one of the developments on the Wincoski River belonging to the Green Mountain Power Corporation. It is located at the Berlin, East Montpelier town line about 3 miles upstream from the city of Montpelier, Vermont. Built in 1908, it is operated in conjunction with a low head hydro-electric plant.

The dam creates a pond having a surface area of about 5 acres at flashboard height. Under present silt conditions, the useable volume impounded by the dam is about 700,000 cu. ft. The drainage area is about 201 sq. mi.

General Description:

This dam is described in detail in Barker & Wheeler's 1926 appraisal report of the property, then operated by the defunct Montpelier & Barre Light and Power Company. In general, it consists of the following:

A spillway section, about 152 ft. long is built on ledge rock and spanning the river channel. At the maximum section it is about 21 ft. high, 3 ft. wide at the crest and 19 ft. wide at the base. Both faces are sloped. The spillway crest is 6 ft. below the top of the dam. Flashboards are provided on the crest to a height of 2.5 ft.

North of the spillway, and adjacent to it, is an intake section containing the usual complement of trash racks

APPENDIX B

PROJECT RECORDS AND PLANS

PERIODIC INSPECTION CHECK LIST

PROJECT Montpelier No. 4 Dam DATE November 21, 1978

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	Not Applicable
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Underside of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

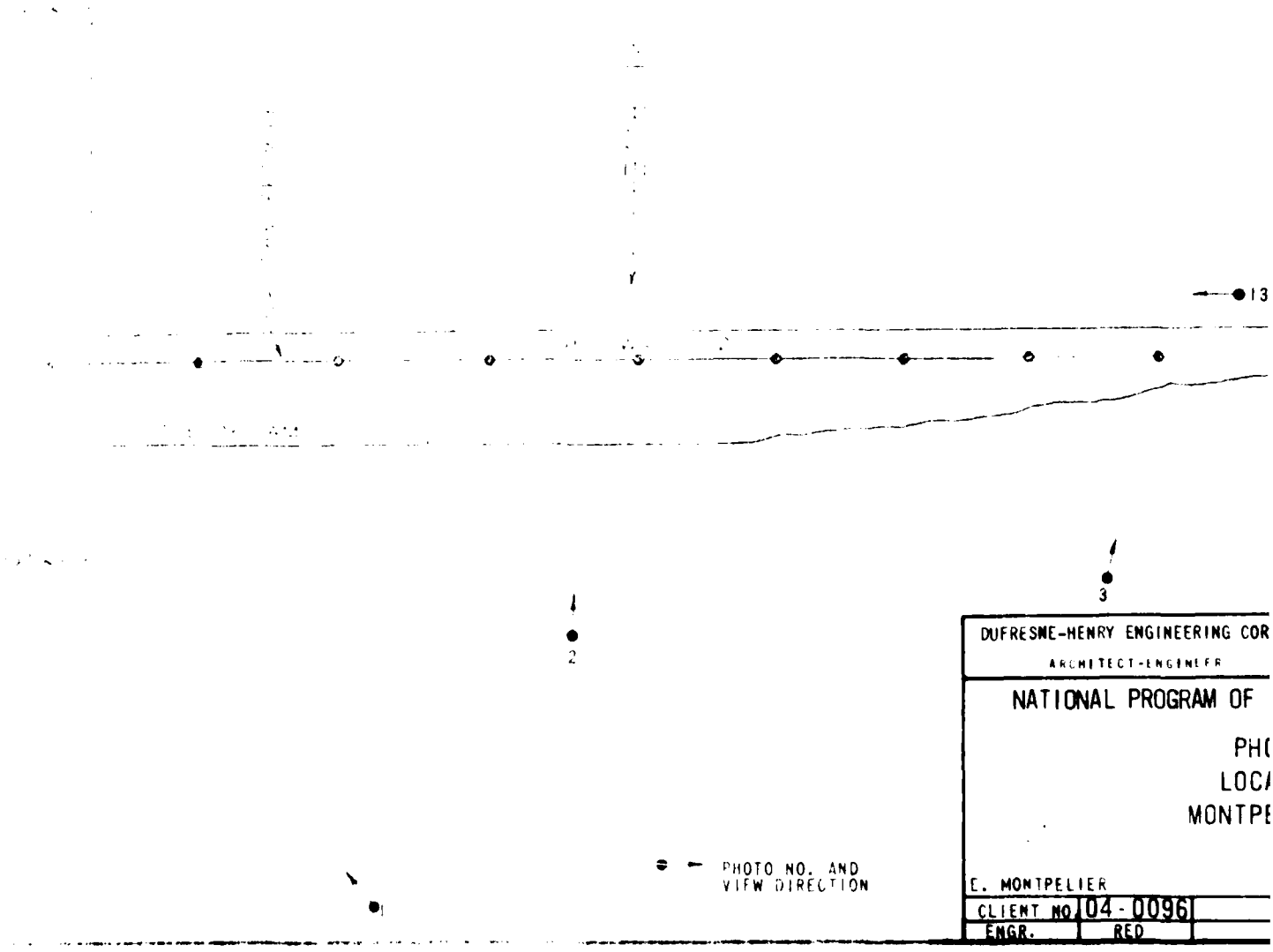
PERIODIC INSPECTION CHECK LIST

PROJECT Montpelier No. 4 Dam DATE November 21, 1978

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	River - mostly open with some silt.
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	River bottom - bedrock not visible, may be silted behind spillway.
b. Weir and Training Walls	
General Condition of Concrete	Dam appears to be poor - irregularity of slope to spillway. Concrete poured on original ground as left abutment/ground.
Rust or Staining	None
Spalling	Spalling on downstream and at left training wall.
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Not visible.
Drain Holes	Not visible.
c. Discharge Channel	
General Condition	OK
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Lined with forested slopes.
Floor of Channel	River channel bedrock.
Other Obstructions	None



DUFRESNE-HENRY ENGINEERING COR

ARCHITECT-ENGINEER

NATIONAL PROGRAM OF

PH(

LOC/

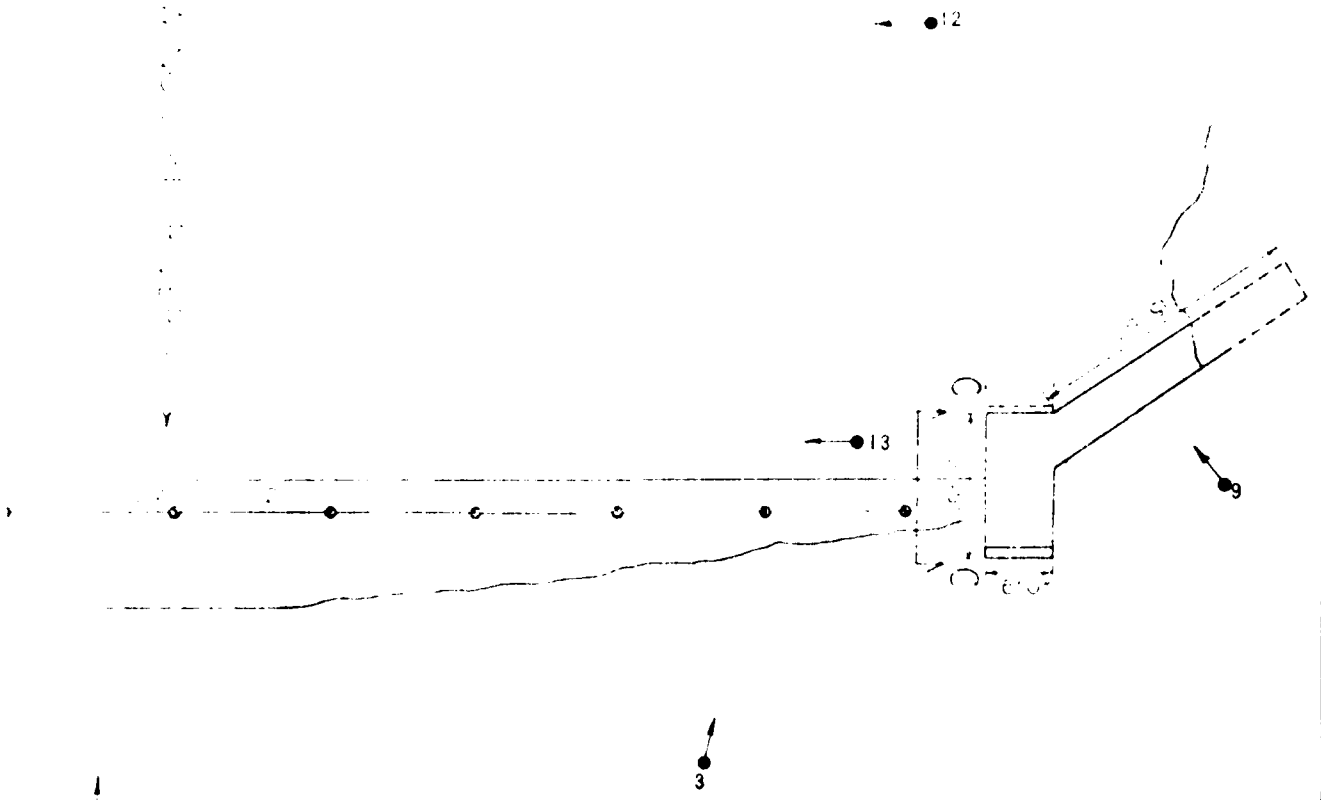
MONTPE

E. MONTPELIER

CLIENT NO. 04-0096

ENGR. RED

2 of 3



DUFRESNE-HENRY ENGINEERING CORP. ARCHITECT-ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

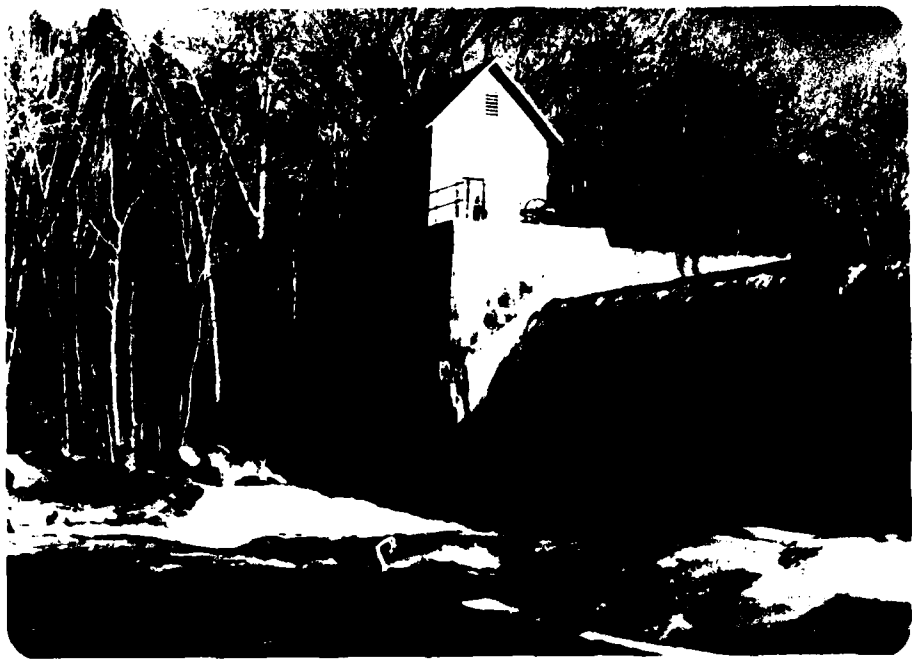
PHOTOGRAPH
LOCATION KEY
MONTPELIER NO. 4

●— PHOTO NO. AND VIEW DIRECTION

E. MONTPELIER VERMONT

CLIENT NO.	04-0096		SCALE NTS
ENGR.	RED		DATE 1-29-79

3 of 3



1. VIEW OF GATE HOUSE AND SEVERED PENSTOCK

2. VIEW OF DAM SPILLWAY

3. VIEW OF LEFT ABUTMENT AND DAM SPILLWAY

4. VIEW OF RIGHT SIDE OF GATE HOUSE

5. DOWNSTREAM VIEW OF GATE HOUSE, PENSTOCK AND WASTE GATE PASSAGEWAY

6. VIEW OF SPALLING AT RIGHT DOWNSTREAM ABUTMENT

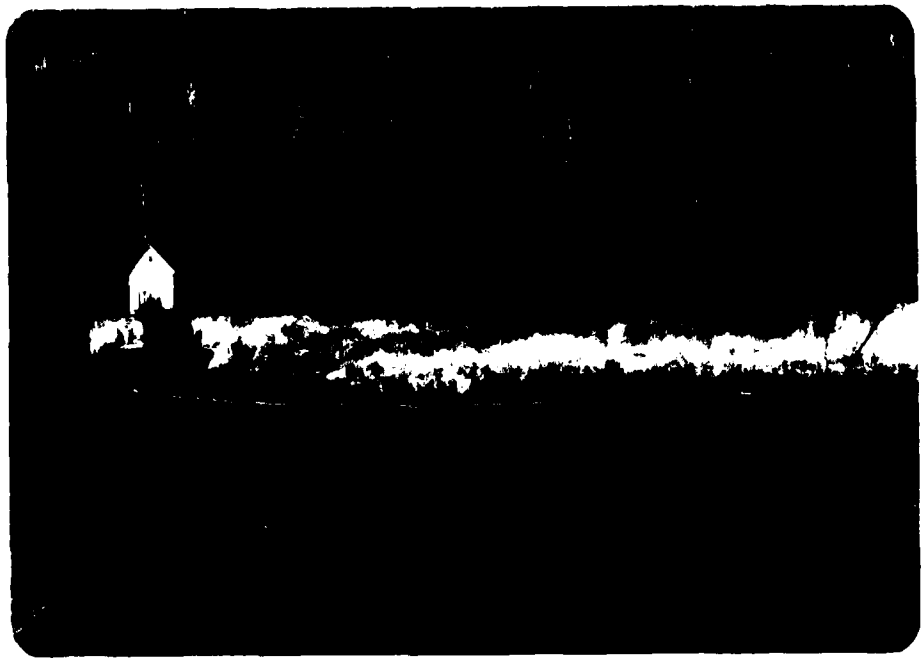
7. VIEW OF SEVERED PENSTOCK

8. VIEW OF WASTE GATE PASSAGEWAY

9. DOWNSTREAM VIEW OF LEFT ABUTMENT

10. VIEW OF SILT DEPOSIT UPSTREAM OF WASTE GATE

11. VIEW OF BEDROCK ON LEFT SIDE OF IMPOUNDMENT



12. VIEW OF SILTATION ON RIGHT SIDE OF IMPOUNDMENT

13. VIEW OF SPILLWAY CREST

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Appendix D

Hydrologic / Hydraulic Computations

Test Flood

size: 16 Ac-ft; H = 22 feet ⟹ small

Hazard; failure poses no threat to life ⟹ Low

Low Hazard, Small size ⟹ 50 to 100-yr frequency

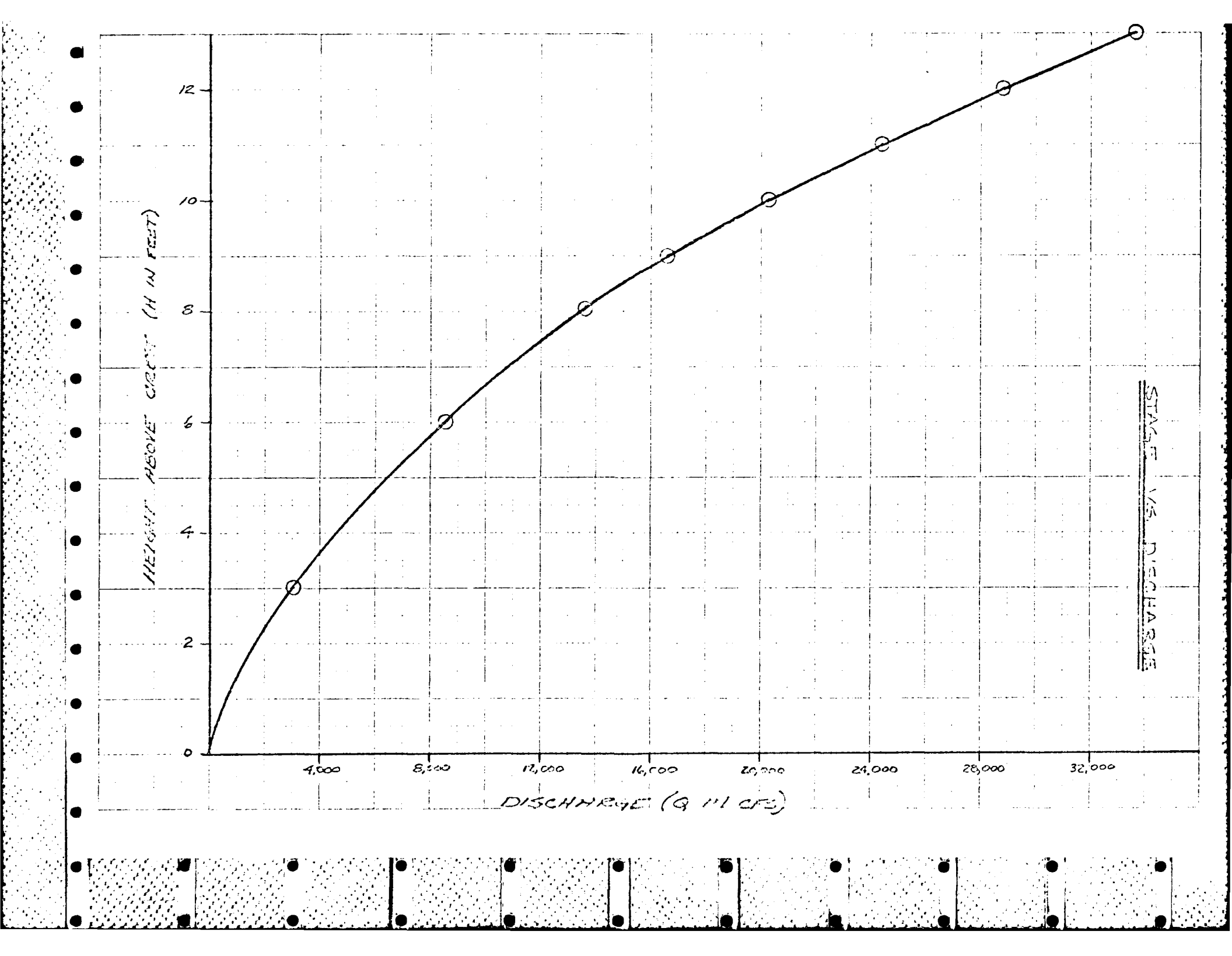
From Flood Insurance Study for City of Montpelier, flow in Winooski River above Stevens Branch ⟹ 17,000 cfs for Q_{100}.

Storage Routing

Pond Surface Area = 4-5 Acres

Drainage Area = 201 square miles

Storage is "run-of-river"; therefore, routing would produce insignificant reduction peak flood flows. No capacity curves are developed or routing performed. Test Flood = 17,000 cfs


STAGE VS. DISCHARGE
HEIGHT ABOVE CREST (H IN FEET)
0
2
4
6
8
10
12
4,000
8,000
12,000
16,000
20,000
24,000
28,000
32,000
DISCHARGE (Q IN CFS)

DUFRESNE-HENRY ENGINEERING CORPORATION

BY _____ SUBJECT _____ SHEET NO. D-3 OF
DATE _____ APPRVD _____ Spillway Discharge Capacity JOB NO. _____

Weir Flow $Q = CLH^{3/2}$

$h = 3'$ $Q = 3.33(152)(3)^{3/2} =$ 2764 cfs

$h = 6'$ $Q = 3.33(152)(6)^{3/2} =$ 8,623 cfs.

$h = 8.05'$ $Q = 3.33(152)(8.05)^{3/2} = 10,279$
$+ 2.5(21.5)(8.05)^{3/2} = 159$ $Q =$ 10,438

$h = 9'$ $Q = 3.33(152)(9)^{3/2} = 15,934$
$+ 2.5(21.5)(9)^{3/2} = 279$
$+ 2.5(180)(.95)^{3/2} = 417$
16,620 $Q =$ 16,620 cfs

$h = 10'$ $Q = 3.33(152)(10)^{3/2} = 18,650$
$+ 2.5(21.5)(4)^{3/2} = 430$
$+ 2.5(180)(1.00)^{3/2} = 1225$
20305 $Q =$ 20,305 cfs

$h = 11'$ $Q = 3.33(152)(11)^{3/2} = 21,516$
$+ 2.5(21.5)(5)^{3/2} = 601$
$+ 2.5(180)(2.00)^{3/2} = 2280$ $Q =$ 24,397 cfs
24,397

$h = 12'$ $Q = 3.33(152)(12)^{3/2} = 24,516$
$+ 2.5(21.5)(6)^{3/2} = 790$
$+ 2.5(180)(3.00)^{3/2} = 3523$
28,839 $Q =$ 28,839 cfs

$h = 13'$ $Q = 3.33(152)(13)^{3/2} = 27,643$
$+ 2.5(21.5)(7)^{3/2} = 995$
$+ 2.5(180)(4.00)^{3/2} = 4956$
33594 $Q =$ 33,594 cfs

SUMMARY PRINTOUT FOR MULTIPLE PROFILES

MENOSKE NO. BR. TO TOWN

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF ROADWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE CFSEC	CWSEL	CRITWS	EG	TOPWID	AREA	TIME	VOL
212.35	0.0	0.0	0.0	526.80	10560.00	513.24	513.24	516.33	130.43	91.60	0.0	0.0
212.05	0.0	0.0	0.0	526.80	31600.00	519.71	519.71	525.76	190.32	75.02	0.0	0.0
212.05	0.0	0.0	0.0	526.80	33600.00	520.52	520.52	526.74	196.39	71.65	0.0	0.0
212.05	0.0	0.0	0.0	526.80	48700.00	525.22	525.22	531.57	306.51	52.04	0.0	0.0
222.07	110.00	0.0	0.0	503.80	10560.00	516.32	0.0	516.74	185.09	7.62	0.01	1.51
222.07	110.00	0.0	0.0	503.80	31600.00	525.28	0.0	526.47	188.09	8.93	0.00	6.72
222.07	110.00	0.0	0.0	503.80	33600.00	526.19	0.0	527.46	188.98	9.09	0.00	7.08
222.07	110.00	0.0	0.0	503.80	48700.00	530.42	0.0	532.24	240.90	10.20	0.00	9.36
232.09	100.00	0.0	0.0	503.60	10560.00	516.29	0.0	516.92	157.91	10.03	0.01	7.73
232.09	100.00	0.0	0.0	503.60	31600.00	524.66	0.0	526.68	179.78	12.35	0.01	14.51
232.09	100.00	0.0	0.0	503.60	33600.00	525.64	0.0	527.67	182.68	12.52	0.01	15.25
232.09	100.00	0.0	0.0	503.60	48700.00	530.15	0.0	532.45	422.50	12.82	0.01	20.17
242.10	60.00	0.0	0.0	506.70	10560.00	515.79	0.0	517.16	154.76	35.45	0.01	9.66
242.10	60.00	0.0	0.0	506.70	31600.00	524.46	0.0	526.93	174.68	22.76	0.01	16.60
242.10	60.00	0.0	0.0	506.70	33600.00	525.43	0.0	527.92	177.61	22.36	0.01	17.34
242.10	60.00	0.0	0.0	506.70	48700.00	529.91	0.0	532.74	182.66	22.19	0.01	25.80
24.10	80.00	516.10	506.90	506.90	10560.00	516.89	0.0	518.83	169.00	60.84	0.01	9.90
24.10	80.00	516.10	506.90	506.90	31600.00	529.25	0.0	530.80	273.09	32.01	0.01	19.05
24.10	80.00	516.10	506.90	506.90	33600.00	529.68	0.0	531.33	379.82	32.03	0.01	20.05
24.10	80.00	516.10	506.90	506.90	48700.00	531.78	0.0	534.02	452.00	33.70	0.01	26.67
252.11	80.00	0.0	0.0	506.50	10560.00	516.72	0.0	518.94	164.86	78.16	0.01	10.11
252.11	80.00	0.0	0.0	506.50	31600.00	528.87	0.0	530.93	366.68	19.73	0.01	19.76
252.11	80.00	0.0	0.0	506.50	33600.00	529.19	0.0	531.49	370.19	21.64	0.01	20.77
252.11	80.00	0.0	0.0	506.50	48700.00	530.65	0.0	534.39	401.29	34.66	0.01	27.56
262.12	100.00	0.0	0.0	511.60	10560.00	518.74	518.74	521.72	152.46	96.18	0.01	12.00
262.12	100.00	0.0	0.0	511.60	31600.00	527.70	0.0	531.54	192.95	38.19	0.01	25.38
262.12	100.00	0.0	0.0	511.60	33600.00	527.72	0.0	532.23	193.95	44.66	0.01	26.54
262.12	100.00	0.0	0.0	511.60	48700.00	530.51	530.51	536.93	366.23	52.72	0.01	36.52
26.30	41.00	531.90	526.80	511.60	10560.00	519.23	0.0	521.78	133.64	72.98	0.02	12.75
26.30	41.00	531.90	526.80	511.60	31600.00	528.98	0.0	532.21	189.26	28.87	0.01	27.38
26.30	41.00	531.90	526.80	511.60	33600.00	528.95	0.0	532.77	187.30	35.20	0.01	28.55
26.30	41.00	531.90	526.80	511.60	48700.00	530.81	0.0	536.93	356.77	49.94	0.01	37.03
272.15	130.00	0.0	0.0	513.20	10560.00	521.39	0.0	522.69	181.20	29.31	0.02	15.68
272.15	130.00	0.0	0.0	513.20	31600.00	531.01	0.0	533.63	297.03	13.85	0.01	35.54
272.15	130.00	0.0	0.0	513.20	33600.00	531.47	0.0	533.25	305.53	14.73	0.01	36.90
272.15	130.00	0.0	0.0	513.20	48700.00	535.55	0.0	537.66	381.95	16.76	0.01	47.96
282.17	100.00	0.0	0.0	513.40	10560.00	521.77	0.0	522.79	193.99	29.32	0.02	16.81
282.17	100.00	0.0	0.0	513.40	31600.00	531.68	0.0	532.80	349.09	10.89	0.02	43.99
282.17	100.00	0.0	0.0	513.40	33600.00	532.25	0.0	533.49	349.09	11.14	0.02	45.76
282.17	100.00	0.0	0.0	513.40	48700.00	536.57	0.0	537.85	349.09	9.37	0.01	60.36

XI	6.923	52.000	1381.000	1461.000	543.000	543.000	543.000	0.0	0.0	0.0
GR	540.600	0.0	563.200	50.000	571.400	150.000	552.900	213.000	546.500	365.000
GR	545.600	473.000	545.100	473.000	546.000	500.000	546.200	574.000	547.200	661.000
GR	546.900	670.000	546.800	700.000	546.300	829.000	551.200	900.000	556.500	920.000
GR	550.000	1050.000	554.100	1225.000	555.400	1275.000	554.500	1375.000	549.100	1375.000
GR	535.400	1381.000	535.000	1387.000	535.100	1396.000	535.200	1405.000	536.400	1418.000
GR	546.800	1424.000	545.200	1438.000	535.200	1452.000	536.000	1461.000	538.400	1469.000
GR	549.400	1470.000	554.500	1470.000	553.000	1495.000	552.800	1525.000	553.000	1605.000
GR	550.000	1805.000	547.500	1965.000	546.600	1980.000	546.000	1985.000	545.400	2005.000
GR	563.600	2010.000	566.100	2015.000	445.200	2040.000	546.800	2045.000	545.800	2048.000
GR	549.200	2170.000	549.200	2180.000	549.700	2230.000	551.200	2290.000	551.800	2330.000
GR	557.400	2350.000	576.700	2450.000	0.0	0.0	0.0	0.0	0.0	0.0
XI	6.923	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
BT	2.000	1375.010	554.500	549.100	1470.000	554.500	548.100	0.0	0.0	0.0
XI	666.930	0.0	0.0	0.0	35.000	35.000	35.000	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
XI	6.930	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
RM	3.000	0.070	1161.000	0.035	1266.000	0.070	1500.000	0.0	0.0	0.0
RC	0.070	0.070	0.035	0.0	0.500	0.0	0.0	0.0	0.0	0.0
XI	655.010	31.000	1205.000	1257.000	528.000	528.000	528.000	0.0	0.0	0.0
GR	571.900	0.0	552.900	85.000	548.500	215.000	545.400	320.000	545.100	321.000
GR	546.000	350.000	546.200	424.000	547.200	513.000	544.900	524.000	546.400	550.000
GR	546.350	674.000	551.200	750.000	554.500	776.000	556.800	814.000	543.100	843.000
GR	548.200	899.000	549.700	1011.000	550.000	1040.000	561.700	1120.000	560.500	1161.000
GR	539.700	1209.000	536.600	1221.000	540.500	1257.000	543.700	1280.000	549.200	1275.000
GR	563.300	1283.000	551.600	1289.000	551.400	1310.000	553.600	1350.000	562.300	1370.000
GR	570.300	1500.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RC	0.035	0.000	0.035	0.0	0.500	0.0	0.0	0.0	0.0	0.0
XI	665.190	17.000	521.000	609.000	845.000	845.000	845.000	0.0	0.0	0.0
GR	569.000	0.0	597.300	53.000	557.300	240.000	556.800	345.000	556.800	409.000
GR	559.000	411.000	552.200	521.000	547.000	533.000	547.000	605.000	547.000	675.000
GR	556.100	845.000	552.900	829.000	560.800	855.000	560.600	883.000	564.800	901.000
GR	561.600	1335.000	566.500	1241.000	0.0	0.0	0.0	0.0	0.0	0.0
RC	0.050	0.080	0.035	0.0	0.500	0.0	0.0	0.0	0.0	0.0
XI	675.390	11.000	270.000	360.000	845.000	845.000	845.000	0.0	0.0	0.0
GR	540.000	0.0	567.000	57.000	566.600	230.000	569.100	240.000	550.700	346.000
GR	568.700	512.000	553.700	360.000	554.100	374.000	565.500	470.000	566.100	474.000
GR	574.500	541.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RC	0.050	0.080	0.040	0.0	0.500	0.0	0.0	0.0	0.0	0.0
XI	685.510	19.000	460.000	540.000	845.000	845.000	845.000	0.0	0.0	0.0
GR	594.600	0.0	569.600	30.000	556.800	70.000	552.800	80.000	540.400	230.000
GR	571.000	250.000	575.200	272.000	577.200	298.000	577.600	310.000	574.600	333.000
GR	585.600	396.000	560.300	410.000	556.000	460.000	553.000	510.000	570.000	560.000
GR	575.000	570.000	560.000	580.000	585.000	595.000	595.000	605.000	0.0	0.0
EJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NC	0.050	0.090	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0
XI	576.190	15.000	98.000	102.000	525.000	525.000	525.000	0.0	0.0	0.0
GR	570.000	0.0	559.700	0.100	557.800	72.000	535.000	50.000	529.600	58.000
GR	523.600	78.000	527.000	102.000	527.600	166.000	534.900	172.000	536.000	231.000
GR	536.100	308.000	537.000	365.000	540.000	366.100	550.000	366.200	570.000	368.300
XI	566.270	19.000	100.000	156.000	420.000	420.000	420.000	0.0	0.0	0.0
GR	570.000	0.0	556.000	0.100	556.000	16.000	553.800	25.000	565.000	41.000
GR	556.800	57.000	528.000	71.000	528.600	100.000	525.600	119.000	526.000	125.000
GR	526.000	159.000	527.000	209.000	536.800	213.000	539.600	336.000	534.800	420.000
GR	536.800	420.100	565.000	423.200	550.000	420.300	570.000	420.400	0.0	0.0
NC	0.050	0.060	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0
XI	596.360	30.000	388.000	439.000	470.000	470.000	470.000	0.0	0.0	0.0
GR	570.000	0.0	565.000	10.000	560.000	30.000	555.500	46.000	555.500	65.000
GR	546.600	166.000	535.600	195.000	537.600	269.000	529.200	322.000	528.800	349.000
GR	526.200	386.000	526.600	407.000	527.500	439.000	537.300	449.000	536.800	519.000
GR	515.600	585.000	536.200	655.000	536.800	755.000	537.600	849.000	540.000	925.000
GR	541.000	1695.000	542.000	1825.000	545.600	1605.000	550.000	1615.000	555.000	1635.000
GR	555.000	1875.000	555.000	1845.000	560.000	1885.000	565.000	1915.000	570.000	1950.000
GT	4.000	16960.000	17000.000	19600.000	34700.000	0.0	0.0	0.0	0.0	0.0
NC	0.060	0.060	0.060	0.0	0.500	0.0	0.0	0.0	0.0	0.0
XI	4.548	35.000	250.000	296.000	1020.000	1020.000	1020.000	0.0	0.0	0.0
GR	575.000	0.0	570.000	14.000	565.000	28.000	550.000	68.000	545.000	78.000
GR	540.000	88.000	545.000	118.000	545.000	158.000	544.600	226.000	526.500	230.000
GR	526.400	216.000	520.700	253.000	521.200	250.000	523.400	257.000	525.000	267.000
GR	526.600	275.000	526.100	283.000	533.100	289.000	536.600	296.000	536.400	302.000
GR	515.900	308.000	537.300	319.000	535.700	322.000	544.400	324.000	544.000	390.000
GR	563.000	1016.000	542.000	1139.000	545.000	1564.000	550.000	1576.000	555.000	1586.000
GR	555.000	1644.000	555.000	1796.000	560.000	1836.000	565.000	1866.000	570.000	1886.000
XI	4.549	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
BT	2.000	224.000	544.410	537.400	326.000	544.410	539.400	0.0	0.0	0.0
XI	616.550	0.0	0.0	0.0	20.000	20.000	20.000	0.0	0.0	0.0
XI	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
XI	4.551	0.0	0.0	0.0	1.000	1.600	1.000	0.0	0.0	0.0
NC	0.050	0.060	0.035	0.0	0.500	0.0	0.0	0.0	0.0	0.0
NH	5.000	0.050	119.000	0.035	250.000	0.040	770.000	0.035	872.000	0.040
NH	1672.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
XI	624.710	37.000	762.000	847.000	950.000	950.000	950.000	0.0	0.0	0.0
GR	570.000	0.0	565.000	20.000	560.000	35.000	555.000	50.000	550.000	65.000
GR	565.000	75.000	540.000	101.000	535.000	115.000	528.600	151.000	528.400	180.000
GR	528.600	201.000	537.300	226.000	536.600	250.000	537.000	315.000	537.200	500.000
GR	537.600	566.000	536.500	570.000	537.800	655.000	537.700	700.000	535.900	754.000
GR	536.600	770.000	528.800	762.000	527.600	812.000	528.600	849.000	536.800	856.000
GR	536.300	872.000	539.300	944.000	540.600	1066.000	544.600	1136.000	544.800	1230.000
GR	545.400	1369.000	560.900	1317.000	566.800	1361.000	556.100	1466.000	549.300	1519.000
GR	566.900	1559.000	563.000	1672.000	0.0	0.0	0.0	0.0	0.0	0.0
XI	636.820	53.000	906.000	961.000	476.000	476.000	476.000	0.0	0.0	0.0
GR	570.000	0.0	565.000	15.000	560.000	40.000	555.000	80.000	552.800	103.000
GR	569.300	131.000	565.000	151.000	543.100	170.000	539.100	187.000	539.400	221.000
GR	535.000	225.000	536.000	344.000	536.500	506.000	531.000	513.000	531.000	517.000
GR	532.700	573.000	538.100	571.000	535.300	665.000	536.500	755.000	534.000	763.000
GR	539.000	835.000	531.900	855.000	531.500	906.000	531.700	963.000	538.100	965.000
GR	537.600	1025.000	537.000	1085.000	535.600	1095.000	536.000	1145.000	546.700	1165.000
GR	563.700	1275.000	546.000	1345.000	546.600	1365.000	547.500	1396.000	547.500	1440.000
GR	566.600	1455.000	546.600	1465.000	545.500	1500.000	543.600	1505.000	546.100	1510.000
GR	545.800	1535.000	546.000	1545.000	545.200	1561.000	545.200	1665.000	549.200	1675.000
GR	549.700	1725.000	551.200	1765.000	551.800	1825.000	557.400	1845.000	576.700	1945.000
NC	0.060	0.060	0.060	0.0	0.500	0.0	0.0	0.0	0.0	0.0

GR	528.300	444.000	533.600	444.000	534.200	443.000	539.600	502.000	545.600	514.000
GR	546.600	562.000	560.200	551.000	570.000	567.000	0.0	0.0	0.0	0.0
NC	0.050	0.050	0.385	0.100	0.200	0.0	0.0	0.0	0.0	0.0
X1	50.352	18.000	276.000	336.000	540.000	540.000	540.000	0.0	0.0	0.0
GR	570.000	0.0	553.600	0.100	556.400	18.600	549.000	40.000	545.000	86.000
GR	542.600	148.000	529.000	162.000	526.200	186.600	526.200	222.000	525.100	278.000
GR	525.600	336.000	532.600	389.000	534.000	358.000	533.000	401.000	542.400	446.000
GR	546.600	460.000	550.600	502.000	570.000	652.000	0.0	0.0	0.0	0.0
NC	0.050	0.050	0.385	0.100	0.200	0.0	0.0	0.0	0.0	0.0
X1	515.652	17.000	244.000	264.000	680.000	680.000	680.000	0.0	0.0	0.0
GR	570.000	0.0	559.600	22.000	552.000	75.000	547.800	25.100	544.600	106.000
GR	543.800	134.000	535.000	167.000	529.600	177.000	525.400	249.000	526.600	266.000
GR	526.600	308.000	526.800	322.000	536.600	360.000	536.600	360.000	544.600	373.000
GR	549.600	405.000	570.000	445.000	0.0	0.0	0.0	0.0	0.0	0.0
X1	528.800	22.000	447.000	541.000	790.000	790.000	790.000	0.0	0.0	0.0
GR	570.000	0.0	560.000	21.000	551.600	34.000	553.000	77.000	552.200	115.000
GR	551.200	138.000	545.133	167.000	543.600	197.000	536.400	241.000	534.600	383.000
GR	542.600	445.000	529.000	447.000	522.800	553.000	529.000	576.000	532.400	574.000
GR	541.600	593.000	545.000	613.000	552.600	631.000	552.000	666.000	555.000	667.000
GR	560.000	674.000	570.000	687.000	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.660	0.660	0.385	0.100	0.200	0.0	0.0	0.0	0.0	0.0
X1	533.920	24.000	520.000	560.000	660.000	660.000	660.000	0.0	0.0	0.0
GR	570.000	0.0	563.000	30.000	549.600	100.000	548.000	214.000	540.600	238.000
GR	545.200	266.000	542.800	314.000	543.200	440.000	542.000	452.000	535.000	548.000
GR	533.200	518.000	529.200	520.000	524.200	532.000	526.400	540.000	526.400	632.000
GR	528.600	643.000	533.200	652.000	542.000	690.000	542.000	702.000	546.000	719.000
GR	550.000	719.000	555.000	723.000	580.000	730.000	570.000	780.000	0.0	0.0
NC	0.050	0.050	0.385	0.100	0.200	0.0	0.0	0.0	0.0	0.0
X1	53.100	17.000	203.000	326.000	560.000	560.000	560.000	0.0	0.0	0.0
GR	570.000	0.0	566.000	0.100	564.000	160.000	548.800	194.000	540.000	199.100
GR	539.600	203.000	525.000	222.100	529.000	229.000	525.000	276.000	525.100	328.000
GR	525.750	342.000	534.800	346.000	546.000	351.000	546.800	351.100	546.400	543.000
GR	550.000	560.100	570.000	560.200	0.0	0.0	0.0	0.0	0.0	0.0
X1	53.200	0.0	0.0	0.0	5.000	5.000	5.000	0.0	0.0	0.0
BT	2.000	139.100	564.800	563.200	351.000	564.800	560.200	0.0	0.0	0.0
X1	53.100	0.0	0.0	0.0	15.000	19.000	19.000	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
X1	544.020	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
X1	54.100	16.000	162.000	238.000	100.000	100.000	100.000	0.0	0.0	0.0
GR	570.000	0.0	563.200	0.100	564.600	102.000	536.800	102.100	536.400	106.000
GR	530.600	106.100	527.300	164.000	525.800	162.600	524.500	208.000	527.000	238.000
GR	519.000	239.100	534.800	242.000	546.600	246.000	546.000	252.000	546.900	342.000
GR	570.000	342.100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	54.200	0.0	0.0	0.0	5.000	5.000	5.000	0.0	0.0	0.0
BT	2.000	102.100	564.000	539.400	242.000	564.000	539.600	0.0	0.0	0.0
X1	54.300	0.0	0.0	0.0	25.000	25.000	25.000	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
X1	554.050	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
X1	564.090	19.000	285.000	320.000	211.000	211.000	211.000	0.0	0.0	0.0
GR	570.000	0.0	563.000	10.000	562.200	30.000	561.200	42.000	562.000	83.000
GR	560.800	102.000	558.800	160.000	529.600	175.000	527.400	221.000	526.600	235.000
GR	526.400	285.000	526.800	418.000	543.800	320.000	562.000	337.000	565.600	346.000
GR	566.000	386.000	565.600	410.000	550.000	410.100	570.000	41m.200	0.0	0.0

A3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GR	560.000	0.0	543.300	81.000	537.400	140.000	536.000	162.000	535.800	190.000	
GR	535.400	208.000	534.200	325.000	532.600	382.000	532.600	445.000	515.800	506.000	
GR	515.400	560.000	520.800	560.000	526.200	576.000	512.600	588.000	536.600	592.000	
GR	536.700	634.000	527.000	642.000	527.000	676.000	526.200	700.000	532.500	738.000	
GR	535.200	765.000	537.900	893.000	536.300	920.000	540.000	920.100	545.000	920.200	
GR	560.000	920.300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
A1	458.090	16.000	63.000	158.000	130.000	130.000	130.000	0.0	0.0	0.0	
GR	570.000	0.0	550.000	0.100	539.600	0.200	533.000	0.000	527.600	4.100	
GR	522.230	32.000	517.000	63.000	517.600	153.000	522.200	196.000	525.800	206.100	
GR	532.700	213.000	532.700	221.000	550.000	221.100	570.000	221.200	0.0	0.0	
A1	45.100	20.000	71.100	153.020	5.000	5.000	5.000	0.0	0.0	0.0	
A2	0.0	0.0	0.0	535.200	538.800	0.0	0.0	0.0	0.0	0.0	
GR	570.000	0.0	550.000	0.100	539.000	0.200	533.000	0.000	527.600	4.100	
GR	517.600	61.000	535.200	61.010	535.200	71.010	517.800	74.100	510.600	112.000	
GR	517.800	142.000	535.200	142.010	535.200	153.010	517.000	156.020	522.200	196.000	
GA	525.800	206.000	532.700	213.000	532.700	221.000	550.000	221.100	570.000	221.200	
A1	45.200	0.0	0.0	0.0	25.000	25.000	25.000	0.0	0.0	0.0	
A2	0.0	0.0	0.0	535.200	538.800	0.0	0.0	0.0	0.0	0.0	
A1	45.300	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0	
MC	0.060	0.060	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
A1	461.190	22.000	687.000	710.000	235.000	235.000	235.000	0.0	0.0	0.0	
GR	570.000	0.0	547.300	182.000	543.600	360.000	537.500	381.000	537.500	435.000	
GR	536.700	460.000	532.500	470.000	532.700	525.000	531.100	542.000	519.100	610.000	
GR	516.600	687.000	516.100	710.000	519.600	735.000	528.400	760.000	528.400	785.000	
GR	532.700	820.000	536.400	855.000	535.600	908.000	536.000	940.000	541.200	972.000	
GR	545.000	985.000	570.000	1010.000	0.0	0.0	0.0	0.0	0.0	0.0	
A1	473.250	21.000	627.000	681.000	555.000	555.000	555.000	0.0	0.0	0.0	
GR	570.000	0.0	557.600	1.000	557.500	22.000	545.600	46.000	538.000	160.000	
GR	536.800	178.000	535.800	282.000	534.000	318.000	521.200	345.000	526.000	369.000	
GR	516.600	393.000	519.600	427.000	517.500	459.000	516.800	481.000	525.000	497.000	
GR	536.000	462.000	535.300	529.000	538.200	574.000	543.200	587.000	543.500	615.000	
GR	570.000	736.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MC	0.060	0.060	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
A1	483.290	26.000	819.000	845.000	230.000	230.000	230.000	0.0	0.0	0.0	
GR	570.000	0.0	542.200	103.000	540.800	167.000	540.900	310.000	539.400	310.100	
GR	535.400	310.200	535.400	311.000	533.500	313.100	533.500	316.000	530.700	316.100	
GR	535.700	388.000	516.600	316.100	518.200	339.000	547.000	362.000	517.400	393.000	
GR	522.800	470.000	529.000	446.000	532.000	448.100	532.000	449.000	533.400	449.100	
GR	544.400	492.000	536.400	432.100	547.000	493.000	545.000	520.000	547.900	558.000	
GA	570.000	560.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MC	0.060	0.060	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
A1	48.100	0.0	0.0	0.0	5.000	5.000	5.000	0.0	0.0	0.0	
BT	2.000	310.200	543.900	535.500	452.000	539.400	534.000	0.0	0.0	0.0	
A1	48.200	0.0	0.0	0.0	25.000	25.000	25.000	0.0	0.0	0.0	
A2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0	
A1	48.250	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0	
MC	0.060	0.060	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
A1	48.300	0.0	0.0	0.0	620.000	620.000	620.000	0.0	0.0	0.0	
MC	0.050	0.050	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
A1	493.420	23.000	273.000	296.100	10.000	10.000	10.000	0.0	0.0	0.0	
GA	570.000	0.0	557.500	15.000	550.400	67.000	567.000	146.000	544.600	151.000	
GR	545.200	182.000	541.600	226.000	539.400	270.000	536.000	273.000	534.000	273.100	
GR	541.400	273.200	521.400	296.000	534.000	296.100	536.000	296.000	528.300	296.100	

GP	537.000	193.000	530.600	189.000	529.200	195.000	519.800	206.000	519.000	209.000
GR	510.100	221.000	515.800	237.000	515.200	308.000	515.000	340.000	519.000	377.000
GP	529.000	365.000	530.600	395.000	534.400	466.000	530.730	514.000	536.400	556.000
GR	531.600	576.000	536.900	580.000	538.300	632.000	541.000	674.000	547.200	806.000
GP	547.700	829.000	550.000	836.000	560.000	866.000	0.0	0.0	0.0	0.0
MC	0.060	0.060	0.085	0.100	0.200	0.0	0.0	0.0	0.0	0.0
K1	382.560	31.000	152.000	338.000	500.000	500.000	500.000	0.0	0.0	0.0
GR	506.000	0.0	534.600	16.000	550.800	16.000	550.000	20.000	540.000	41.000
GP	535.400	101.000	531.600	111.000	531.200	115.000	531.600	137.000	530.900	169.000
GR	527.400	152.000	527.200	157.000	524.500	168.000	516.200	188.000	514.400	208.000
GP	514.800	229.000	515.400	248.000	518.500	299.000	519.800	318.000	523.800	325.000
GR	529.500	338.000	531.400	416.000	530.700	477.000	530.300	545.000	532.100	665.000
GP	536.800	719.000	540.300	768.000	540.900	826.000	547.400	867.000	550.000	883.000
GR	560.000	963.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MC	0.060	0.060	0.085	0.100	0.200	0.0	0.0	0.0	0.0	0.0
K1	392.650	20.000	78.000	293.000	650.000	650.000	650.000	0.0	0.0	0.0
GP	540.000	0.0	550.000	0.100	539.000	0.200	533.000	56.000	531.200	78.000
GR	521.700	91.000	521.800	102.000	516.100	132.000	516.000	220.000	521.800	265.000
GP	529.300	285.000	531.200	291.000	531.200	384.000	529.000	470.000	533.700	595.000
GR	535.900	628.000	536.600	710.000	536.800	730.600	550.000	734.100	560.000	734.200
A1	99.100	0.0	0.0	0.0	10.000	10.000	10.000	0.0	0.0	0.0
B1	0.000	96.000	535.200	533.000	78.000	535.200	531.200	293.000	535.200	531.200
B7	384.000	531.210	531.200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A1	39.200	0.0	0.0	0.0	10.000	10.000	10.000	0.0	0.0	0.0
A2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
A1	39.300	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
A1	402.750	23.000	137.000	269.000	360.000	360.000	360.000	0.0	0.0	0.0
GP	550.000	0.0	548.200	28.000	537.800	84.000	534.200	80.000	532.600	114.000
GR	532.200	118.000	529.200	137.000	517.200	174.000	517.600	262.000	520.000	269.000
GP	529.000	367.000	531.200	344.000	532.400	379.000	532.000	419.000	532.500	464.000
GR	531.400	516.000	532.600	615.000	533.400	626.000	535.000	689.000	536.000	717.000
GP	540.200	777.100	550.000	729.000	560.000	770.000	0.0	0.0	0.0	0.0
MC	0.060	0.060	0.085	0.100	0.200	0.0	0.0	0.0	0.0	0.0
A1	417.830	26.000	145.000	326.000	510.000	510.000	510.000	0.0	0.0	0.0
GP	560.000	0.0	563.000	71.000	531.600	95.000	530.800	121.000	533.200	129.000
GR	532.600	157.000	535.600	172.000	533.000	181.000	530.000	185.000	520.400	198.000
GP	516.400	210.000	516.000	245.000	517.200	277.000	519.600	326.000	525.200	338.000
GR	527.600	384.000	530.200	400.000	528.400	456.000	526.400	502.000	529.200	535.000
GP	532.000	565.000	530.500	665.000	539.600	665.000	539.000	665.000	550.000	699.000
GR	560.000	779.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MC	0.060	0.060	0.085	0.100	0.200	0.0	0.0	0.0	0.0	0.0
A1	422.910	26.000	122.000	269.000	605.000	605.000	605.000	0.0	0.0	0.0
GP	560.000	0.0	538.600	35.000	537.000	76.000	536.200	83.000	530.000	93.000
GR	526.600	99.000	520.600	105.000	520.000	124.000	516.800	166.000	517.000	216.000
GP	519.800	269.000	526.600	282.000	528.000	334.000	526.000	367.000	529.600	417.000
GR	531.200	680.000	532.800	566.000	544.200	666.000	537.000	642.000	537.800	662.000
GP	536.600	689.000	540.300	700.000	550.000	722.000	560.000	756.000	0.0	0.0
MC	0.060	0.060	0.085	0.100	0.200	0.0	0.0	0.0	0.0	0.0
A1	432.990	26.000	291.000	407.000	625.000	625.000	625.000	0.0	0.0	0.0
GP	560.000	0.0	551.000	18.000	545.200	89.000	537.800	100.000	536.100	133.000
GR	536.100	199.000	533.600	261.000	527.600	273.000	522.000	284.000	517.200	332.000
GP	516.800	361.000	519.600	407.000	521.800	436.000	527.000	467.000	526.400	490.000
GR	528.600	535.000	527.600	575.000	530.200	604.000	535.000	639.000	538.600	810.000
GP	537.000	829.000	536.800	851.000	540.800	871.000	542.800	889.000	550.000	919.000
GR	560.000	986.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A1	441.070	26.000	445.000	560.000	630.000	630.000	630.000	0.0	0.0	0.0

BR	510.500	143.000	508.500	187.000	509.800	228.000	512.300	248.000	514.800	271.000
GR	528.000	273.000	528.600	323.000	527.600	380.000	526.900	455.000	526.800	476.000
XI	252.110	19.000	127.000	272.200	10.000	10.000	10.000	0.0	0.0	0.0
GR	560.000	0.0	530.300	24.000	530.600	58.000	530.800	78.000	528.000	127.000
GR	520.600	127.100	518.500	121.200	518.700	143.000	508.500	187.000	509.900	227.000
GR	512.400	267.000	514.800	272.000	520.600	272.100	526.000	272.200	528.800	321.000
GR	527.700	380.000	526.800	451.000	526.700	476.000	560.000	480.000	0.0	0.0
XI	262.120	21.000	443.100	564.000	100.000	100.000	100.000	0.0	0.0	0.0
GR	560.000	0.0	553.000	31.000	541.900	51.000	538.800	117.000	531.900	249.000
GR	530.200	359.000	530.200	405.000	530.400	443.000	530.000	463.100	519.300	443.200
GR	511.700	443.300	511.600	454.000	512.200	504.000	514.300	564.000	514.300	577.000
GR	522.000	585.000	530.000	585.100	529.900	592.000	528.600	657.000	526.300	665.000
GR	560.000	685.100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SB	0.900	1.560	2.530	0.0	141.600	3.000	2115.000	0.010	511.600	511.600
XI	26.300	0.0	0.0	0.0	41.600	41.000	41.600	0.0	0.0	0.0
XI	0.0	0.0	1.000	528.800	531.400	0.0	0.0	0.0	0.0	0.0
BT	11.000	117.000	538.600	0.0	249.000	538.400	0.0	359.000	530.200	0.0
BT	408.000	533.200	0.0	443.000	531.600	0.0	506.500	533.700	0.0	584.000
BT	532.300	0.0	542.000	529.500	0.0	657.000	528.600	0.0	665.000	528.300
BT	0.0	685.100	534.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
XI	272.450	21.000	148.000	320.000	130.000	130.000	130.000	0.0	0.0	0.0
GR	560.000	0.0	550.000	0.100	532.500	0.200	526.900	78.000	529.200	98.000
GR	526.600	118.000	529.600	127.000	526.800	133.000	519.300	142.000	517.100	193.000
GR	514.300	172.000	513.200	213.000	513.500	255.000	514.100	287.000	517.200	320.000
GR	519.300	328.000	526.600	322.000	527.500	322.100	529.300	332.100	550.000	332.200
GR	560.000	332.300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.050	0.050	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0
XI	262.170	21.000	95.100	299.000	100.000	100.000	100.000	0.0	0.0	0.0
GR	560.000	0.0	550.000	0.100	528.300	0.200	527.600	61.000	527.900	71.000
GR	527.600	80.000	528.200	89.000	527.100	95.000	526.900	95.100	526.000	101.000
GR	519.300	108.000	513.600	138.000	513.400	171.000	513.900	208.000	514.800	249.000
GR	516.700	284.000	514.100	290.000	526.900	299.000	527.000	480.000	550.000	480.100
GR	560.000	480.200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.050	0.050	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0
XI	312.230	21.000	130.000	349.000	300.000	300.000	300.000	0.0	0.0	0.0
GR	560.000	0.0	550.000	0.100	528.500	0.200	527.600	69.000	526.400	100.000
GR	526.500	119.000	526.700	130.000	526.100	137.000	519.100	141.000	514.200	166.000
GR	514.200	207.000	516.600	250.000	515.300	302.000	516.600	336.000	519.300	335.000
GR	526.700	345.000	527.600	349.000	527.200	385.000	527.300	485.000	550.000	485.100
GR	560.000	485.200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.050	0.050	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0
XI	352.310	21.000	116.000	329.200	400.000	400.000	400.000	0.0	0.0	0.0
GR	560.000	0.0	529.600	13.000	528.800	56.000	527.600	69.000	527.600	103.000
GR	526.200	116.000	525.600	124.000	519.300	137.000	514.600	185.000	515.800	220.000
GR	516.000	281.000	517.600	329.000	519.300	329.100	526.200	329.200	527.800	329.300
GR	529.000	373.000	528.600	402.000	528.600	404.000	527.600	454.000	529.200	522.000
GA	532.100	593.000	532.500	627.000	560.600	627.100	0.0	0.0	0.0	0.0
XI	362.390	21.000	147.000	384.000	430.000	430.000	430.000	0.0	0.0	0.0
GR	560.000	0.0	550.000	25.000	543.100	36.000	533.900	66.000	532.100	97.000
GR	529.400	165.000	528.100	154.000	529.300	175.000	529.100	191.000	527.300	197.000
GR	520.000	209.000	514.300	213.000	519.400	238.000	545.800	277.000	545.500	317.000
GA	515.500	356.000	519.300	364.000	519.700	357.000	529.600	393.000	529.900	455.000
GR	530.100	496.000	530.500	523.000	531.100	572.000	534.000	600.000	563.300	659.000
GR	550.000	731.000	560.000	761.000	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.060	0.060	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0
XI	372.440	28.000	209.000	377.000	300.000	300.000	300.000	0.0	0.0	0.0
BA	560.000	0.0	538.600	73.000	537.600	61.000	534.500	100.000	534.400	128.000

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HEC2 VERSION UPDATED JAN 1975
ERROR CORRECTIONS 01,02,03,04,05,06,07,08
MODIFICATIONS 52,53,54,55,56,57,58
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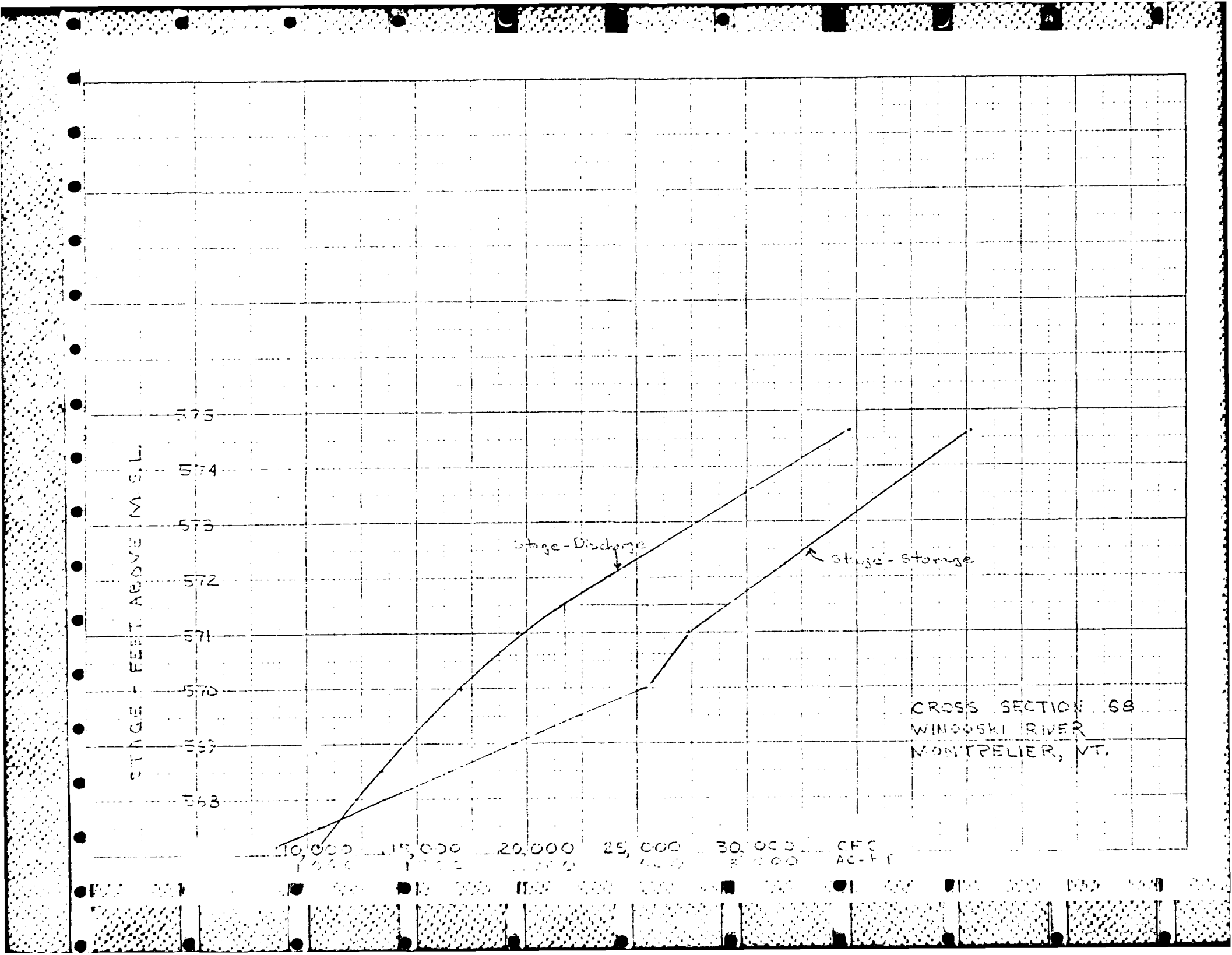
T1 FLOODWAY ANALYSIS FOR THE CITY OF MONTPELIER, VERMONT
T2 EXISTING CONDITIONS WITH DAM FAILURE
T3 WINOOSKI R. BR TO TOWN LINE

	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
J1	0.	2.	0.	0.	-1.0000000	0.0	0.0	0.	506.800	0.0

	NPROF	IPLOT	PRFVS	XSECN	XSECH	FN	ALLOC	IBW	CHNIM	ITRACE
J2	1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

QT	6.000	10940.000	31000.000	33600.000	48300.000	0.0	0.0	0.0	0.0	0.0	
NC	0.050	0.050	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
X1	212.050	86.000	178.000	462.000	0.0	0.0	0.0	0.0	0.0	0.0	
GR	960.000	0.0	529.600	0.000	528.600	622.000	520.100	1[illegible]	514.700	159.000	
GR	514.700	159.100	507.900	178.000	506.900	208.000	506.800	226.000	506.800	240.000	
GR	506.800	271.000	507.100	282.000	523.600	306.000	526.000	326.000	526.000	426.000	
GR	560.000	427.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
NC	0.045	0.045	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
X1	222.070	23.000	136.000	247.000	110.000	110.000	110.000	0.0	0.0	0.0	
GR	560.000	0.0	550.000	0.100	529.700	0.000	5[illegible]	6[illegible]	530.100	69.000	
GR	530.900	127.000	526.000	131.000	508.400	136.000	507.900	1[illegible]	506.900	192.000	
GR	506.000	159.000	505.800	178.000	506.400	267.000	507.900	2[illegible]	505.500	269.000	
GR	508.000	306.000	508.100	319.000	530.900	329.100	550.000	3[illegible]	560.000	3[illegible]	
NC	0.050	0.050	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
X1	232.090	23.000	137.000	257.000	100.000	100.000	100.000	0.0	0.0	0.0	
GR	960.000	0.0	550.000	0.100	530.000	0.000	530.0[illegible]	6[illegible]	530.900	6[illegible]	
GR	530.100	86.000	526.500	92.000	520.300	110.000	508.600	1[illegible]	507.600	180.000	
GR	506.900	1[illegible]	508.600	137.000	508.900	169.000	508.000	1[illegible]	508.000	257.000	
GR	508.000	259.000	526.500	282.000	528.500	290.000	528.000	3[illegible]	528.500	470.000	
GR	528.500	4[illegible]	550.000	4[illegible]	5[illegible]	6[illegible]	0.0	0.0	0.0	0.0	
NC	0.050	0.050	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
X1	262.100	19.000	120.000	271.000	60.000	60.000	60.000	0.0	0.0	0.0	
GR	560.000	0.0	550.000	0.100	530.000	0.000	530.000	60.000	530.500	69.000	
GR	530.100	86.000	529.900	117.000	512.500	119.600	510.000	120.000	508.000	124.000	
GR	508.700	127.000	508.000	202.000	507.800	240.000	507.800	260.000	512.500	271.000	
GR	530.100	281.000	530.100	481.000	550.000	481.100	560.000	481.200	0.0	0.0	
NC	0.050	0.050	0.035	0.100	0.200	0.0	0.0	0.0	0.0	0.0	
SB	0.0	0.0	2.800	0.0	645.000	0.0001	0.0001	0.0	514.100	514.100	
X1	26.100	15.000	122.100	476.000	10.000	10.000	10.000	0.0	0.0	0.0	
X2	0.0	0.0	1.000	504.930	516.100	0.0	0.0	0.0	0.0	0.0	
X3	1.000	516.890	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
BT	15.000	5.000	530.000	0.0	51.000	530.800	0.0	1[illegible]	526.000	0.0	
BT	103.100	514.100	0.0	122.100	514.100	0.0	141.000	514.100	0.0	187.000	
BT	514.100	0.0	228.000	514.100	0.0	248.000	514.100	0.0	248.100	528.600	
BT	0.0	248.000	528.600	0.0	380.600	528.600	0.0	452.000	527.900	0.0	
BT	476.000	527.700	0.0	585.000	527.700	0.0	0.0	0.0	0.0	0.0	
GR	530.200	24.000	530.000	56.000	530.900	78.000	528.000	122.000	513.200	122.100	


STAGE - FEET ABOVE M.S.L.
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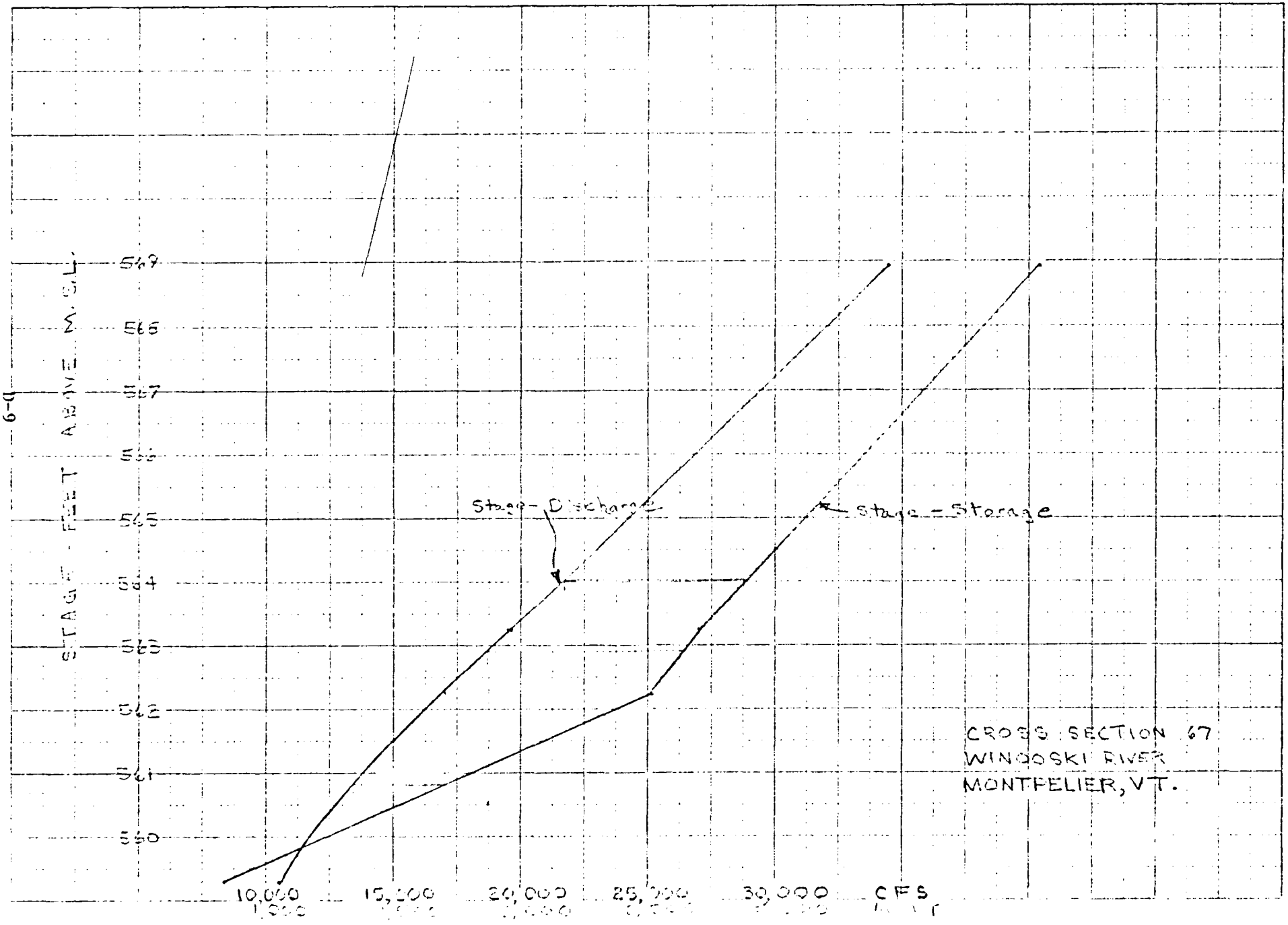
574
573
572
571
570
569
568
Stage-Discharge
Stage-Storage
10,000
15,000
20,000
25,000
30,000
CFS
AC-FT
CROSS SECTION 68
WINOOSKI RIVER
MONTPELIER, VT.


STAGE - FEET ABOVE M.S.L.
569
566
567
565
564
563
562
561
560
Stage - Discharge
Stage - Storage
10,000
15,000
20,000
25,000
30,000
CFS
CROSS SECTION 67
WINOOSKI RIVER
MONTPELIER, VT.

Trial No. 2
Parameters of (13,400 + 5,300 = 18,700 cfs)

	stage	storage
xs - 68	570.6	2662
xs - 67	562.9	2640
		22 Ac-ft

Active storage = 22 - 12 = 10 Ac-ft

$V_{AVG} = (10 + 13)/2 = 11.5$

22 - 12 = 10

$Q_{P_2} = 8,300\left(1 - \frac{11.5}{36}\right) = 5,650$ cfs

$Q_{Total} = 13,400 + 5,650 = 19,050$ cfs

$\Delta Q < 2\%$ ∴ use Q_{P_2}

Conclude: $Q_{failure} = 8,300$ cfs at 36 Ac-ft will be reduced approximately 32% per 845 foot reach subject to asymptotic decay. Therefore, Q at first highway bridge, U.S. Route 2, (xs 69→65) 1 mile downstream of dam will be very close to Q prior to failure, 13400 cfs. Q at first location for overbank flooding, 3000 feet downstream of dam, will also be about the same as that prior to failure. The impact of the dam failing is minor by comparison to the flood conditions which would exist prior to the dam failing. The flood within this first 3,000 foot reach will be within banks inundating an area not to exceed 300 feet in width.

Dam Failure

Water at top of dam - concrete spillway failing

Stage = 613.25 at top of dam Y_o = 26.22

Crest of dam = 610.2

Length of spillway = 152'

Width of breach = (.4)(152) = 60.8'

Discharge required for water to be at top of dam = 13,400 cfs

Discharge on remaining dam = $CLH^{3/2}$ = 3.88 (91.2)(9)$^{3/2}$ = 8000 cfs

Discharge through breach = $\frac{8}{27} \omega_L \sqrt{g} \left(\frac{Y}{0}\right)^{3/2}$ = $\frac{8}{27}$ (60.8)(5.37)(26.2)$^{3/2}$ = 13700 cfs

Total failure flow = 13700 cfs + 8,000 cfs = 21,700 cfs

Increase due to failure = 8,300 cfs ← Flow (Q_{P_1})

Volume behind dam at failure = 16 Ac-ft + 8(4) = 48 Ac-ft

Hydraulic Capacity of Breach = $Q = (3.08)(60.8)H^{3/2}$ = 13,400 cfs

$$H = \left(\frac{13400}{(187.26)}\right)^{2/3} = 17.2'$$

Stage behind dam drops to (592 + 17.2) = 609.23'

Volume retained at instant of failure = 48 - 4(7) = 12 Ac-ft

Volume Released = 48 - 12 = 36 Ac-ft ← Volume Released (S)

Flow - Routing rules in HEC-2 output

Stage - Qty at Matpeller T/L XS 6.8 for 21,700 cfs = 571.5

XS 6.7 for 21,700 cfs = 564.0

21,700 cfs		13,400 cfs	
Stage at 571.5	2925	568.5	1687
564.0	2900	560.8	1675
	25 Ac-ft		12 Ac-ft

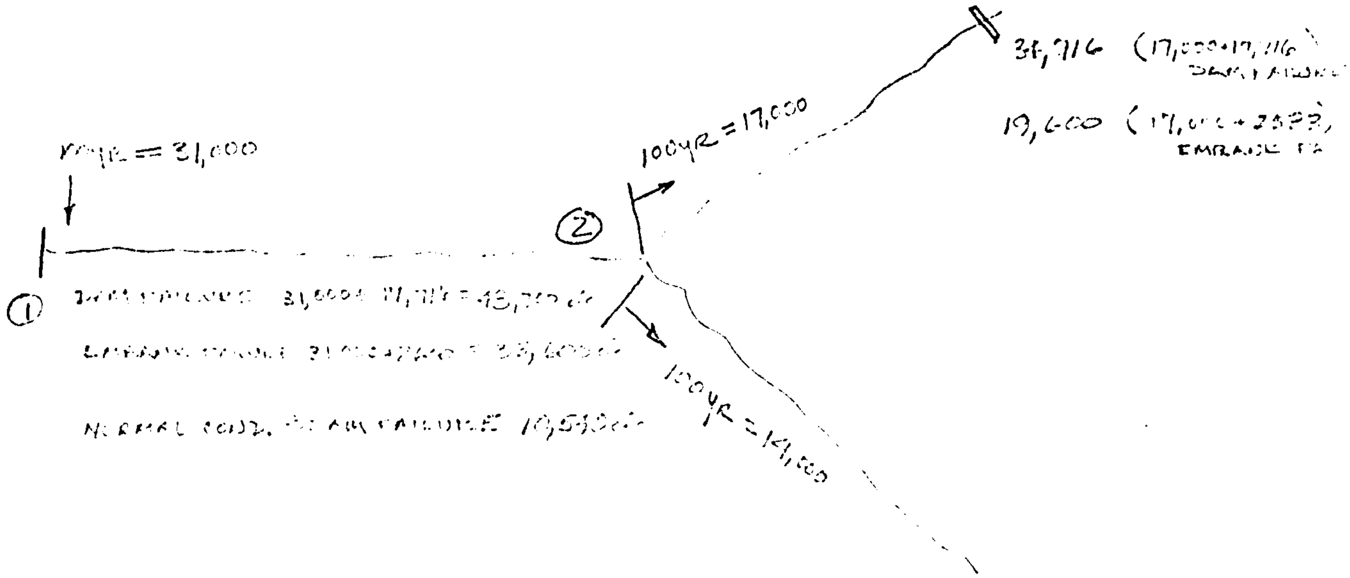
Difference (Active in flood-wave routing) = 25 - 12 = 13 Ac-ft (V_1)

$$Q_{P_2} = Q_{P_1}\left(1 - \frac{V_1}{S}\right) = 8,300\left(1 - \frac{13}{36}\right) = 5300 \text{ cfs}$$

DUFRESNE-HENRY ENGINEERING CORPORATION

BY N.A. [illegible] SUBJECT Montpelier #4 Dam SHEET NO. D-5 OF ___

DATE 7/5/79 Schematic for Q.T. [illegible] JOB NO. [illegible]



①

Normal conditions – dam failure	—	10,540 cfs
100 yr flood conditions	—	31,000 cfs
100 yr flood with embank failure	—	33,600 cfs
100 yr flood with dam failure	—	48,[illegible] cfs

②

Normal conditions – dam failure	—	10,540 cfs
100 yr flood conditions	—	17,000 cfs
100 yr flood with embank failure	—	19,600 cfs
100 yr flood with dam failure	—	34,700 cfs

100 yr flood = 17,000 cfs

From graph $d = 9.1'$

$W_{S\,EL} = 9.1 + 610.2 = 619.3$

For dam failure under present conditions:

① Assume .4 of dam fails

$Q_1 = 8/27\ W_b \sqrt{g}\ y_0^{3/2}$

$Q_1 = 8/27\ (.4)(152)(5.67)(22)^{3/2} = 10,540\ cfs$

For a 20' section of dam failing ⇒ $Q_2 = 8/27(20)(5.67)(22)^{3/2} = 3460\ cfs$

For dam failure under 100 yr flood conditions:

$Q_{Total} = Q_{River} + Q_{Failure}$

$Q_{Failure} = 8/27\ W_b \sqrt{g}\ y_0^{3/2}$

$Q_{F_1} = 8/27(.4)(152)(5.67)(31.1)^{3/2} = 17,716\ cfs$

$Q_{F_2} = 8/27\ (20)(5.67)(31.1)^{3/2} = 5,827\ cfs$

$Q_{Total_1} = 17,000 + 17,716 \Rightarrow 34,700\ cfs$

$Q_{Total_2} = 17,000 + 5,827 = 22,827\ cfs$

For earth embankment failure under 100 yr flood conditions:

Assume silt level behind embankment is at crest level of dam.

$Q_{Total} = Q_{River} + Q_{Failure}$

$Q_{Failure} = 8/27\ W_b \sqrt{g}\ y_0^{3/2}$

$Q_F = 8/27(.4)(140)(5.67)(9.1)^{3/2} = 2583\ cfs$

$Q_{Total} = 17,000 + 2583 \Rightarrow 19,600\ cfs$

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF ROADWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE CFSEC	CWSEL	CRITWS	EG	TOPWID	IOPRS	TIME	VOL
312.23	300.00	0.0	0.0	514.20	10540.00	522.74	0.0	523.56	199.66	21.26	0.03	28.29
312.23	300.00	0.0	0.0	514.20	31000.00	532.22	0.0	533.12	484.84	9.12	0.03	74.60
312.23	300.00	0.0	0.0	514.20	33600.00	532.68	0.0	533.76	484.84	9.18	0.03	78.17
312.23	300.00	0.0	0.0	514.20	48700.00	537.17	0.0	538.13	644.66	7.39	0.03	105.97
352.31	400.00	0.0	0.0	514.60	10540.00	523.60	0.0	524.40	197.65	21.13	0.05	41.66
352.31	400.00	0.0	0.0	514.60	31000.00	532.52	0.0	533.54	618.02	13.95	0.04	118.04
352.31	400.00	0.0	0.0	514.60	33600.00	533.13	0.0	534.19	618.22	10.96	0.04	124.64
352.31	400.00	0.0	0.0	514.60	48700.00	537.65	0.0	538.65	619.65	8.26	0.04	174.45
362.39	430.00	0.0	0.0	515.40	10540.00	526.46	0.0	525.23	189.90	17.45	0.07	58.30
362.39	430.00	0.0	0.0	515.40	31000.00	532.74	0.0	534.13	501.54	13.09	0.06	166.25
362.39	430.00	0.0	0.0	515.40	33600.00	533.32	0.0	534.74	516.55	13.31	0.05	170.21
362.39	430.00	0.0	0.0	515.40	48700.00	537.48	0.0	538.95	584.77	10.82	0.05	244.65
372.44	300.00	0.0	0.0	515.00	10540.00	524.96	0.0	5.5.70	186.80	13.91	0.08	66.92
372.44	300.00	0.0	0.0	515.00	31000.00	533.64	0.0	534.56	490.59	13.00	0.06	166.26
372.44	300.00	0.0	0.0	515.00	33600.00	533.61	0.0	535.21	494.80	13.38	0.06	168.12
372.44	300.00	0.0	0.0	515.00	48700.00	537.61	0.0	539.35	528.73	11.98	0.06	240.83
382.54	530.00	0.0	0.0	516.20	10540.00	525.67	0.0	526.44	184.00	15.22	0.10	84.58
382.54	500.00	0.0	0.0	516.20	31000.00	533.84	0.0	535.22	594.80	13.55	0.06	234.99
382.54	500.00	0.0	0.0	516.20	33600.00	534.50	0.0	535.90	609.30	11.82	0.08	240.56
382.54	500.00	0.0	0.0	516.20	48700.00	538.67	0.0	539.95	694.99	10.20	0.08	341.95
392.65	650.00	0.0	0.0	516.00	10540.00	526.74	0.0	527.58	196.66	15.58	0.13	108.05
392.65	650.00	0.0	0.0	516.00	31000.00	535.08	0.0	536.00	636.00	9.53	0.10	299.11
392.65	650.00	0.0	0.0	516.00	33600.00	535.73	0.0	536.67	657.32	9.42	0.10	320.32
392.65	650.00	0.0	0.0	516.00	48700.00	539.61	0.0	540.58	733.84	7.78	0.10	436.90
39.10	10.00	531.21	533.00	516.00	10540.00	526.78	0.0	527.70	196.91	13.31	0.13	108.43
39.10	10.00	531.21	533.00	516.00	31000.00	534.74	0.0	536.04	617.91	9.62	0.10	300.12
39.10	10.00	531.21	533.00	516.00	33600.00	535.41	0.0	536.72	652.67	13.18	0.10	321.83
39.10	10.00	531.21	533.00	516.00	48700.00	539.77	0.0	540.58	733.82	38.37	0.10	436.88
39.20	10.00	531.21	533.00	516.00	10540.00	526.78	0.0	527.91	196.36	13.25	0.13	108.61
39.20	10.00	531.21	533.00	516.00	31000.00	536.65	0.0	536.19	620.79	49.97	0.10	304.08
39.20	10.00	531.21	533.00	516.00	33600.00	535.72	0.0	536.80	657.22	70.11	0.10	322.81
39.20	10.00	531.21	533.00	516.00	48700.00	539.81	0.0	540.62	733.82	37.86	0.10	440.30
39.30	1.00	0.0	0.0	516.00	10540.00	526.78	0.0	527.41	196.36	13.24	0.13	108.64
39.30	1.00	0.0	0.0	516.00	31000.00	535.31	0.0	536.19	635.98	8.96	0.10	301.11
39.30	1.00	0.0	0.0	516.00	33600.00	535.91	0.0	536.82	664.88	8.99	0.10	323.92
39.30	1.00	0.0	0.0	516.00	48700.00	539.72	0.0	540.65	733.81	7.80	0.10	440.48
402.73	360.00	0.0	0.0	517.20	10540.00	527.13	0.0	527.97	177.46	15.78	0.14	121.83
402.73	360.00	0.0	0.0	517.20	31000.00	535.27	0.0	536.86	600.00	12.86	0.12	340.40
402.73	360.00	0.0	0.0	517.20	33600.00	535.86	0.0	537.51	637.20	12.43	0.11	365.31
402.73	360.00	0.0	0.0	517.20	48700.00	539.67	0.0	541.08	661.13	10.61	0.11	549.38

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF ROADWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE CFS	CWSEL	CRITWS	EG	TOPWID	AOKOS	TIME	VOL
412.83	510.00	0.0	0.0	514.40	105600.00	527.92	0.0	528.71	180.94	13.47	0.16	139.50
412.83	510.00	0.0	0.0	514.40	315000.00	536.30	0.0	537.49	574.94	9.67	0.13	296.78
412.83	510.00	0.0	0.0	514.40	336000.00	536.93	0.0	537.92	577.76	9.77	0.13	629.68
412.83	510.00	0.0	0.0	514.40	487000.00	540.48	0.0	541.80	616.87	9.20	0.13	631.93
422.91	405.00	0.0	0.0	516.10	105600.00	528.82	0.0	529.17	261.30	8.50	0.16	155.65
422.91	405.00	0.0	0.0	516.10	315000.00	536.81	0.0	537.64	574.81	7.66	0.15	447.69
422.91	405.00	0.0	0.0	516.10	335000.00	537.61	0.0	538.29	614.56	7.61	0.15	48...09
422.91	405.00	0.0	0.0	516.10	487000.00	540.97	0.0	541.95	674.30	7.65	0.15	708.89
432.99	425.00	0.0	0.0	518.80	105600.00	526.94	0.0	529.82	322.99	12.08	0.20	174.19
432.99	425.00	0.0	0.0	518.80	315000.00	537.04	0.0	538.04	739.89	9.87	0.17	506.15
432.99	425.00	0.0	0.0	518.80	336000.00	537.65	0.0	538.69	755.20	9.91	0.16	538.53
432.99	425.00	0.0	0.0	518.80	487000.00	541.26	0.0	542.31	780.92	8.95	0.16	788.25
443.07	430.00	0.0	0.0	515.40	105600.00	524.39	0.0	530.80	258.31	10.16	0.22	197.33
443.07	430.00	0.0	0.0	515.40	315000.00	537.37	0.0	538.49	740.47	9.97	0.18	551.84
443.07	430.00	0.0	0.0	515.40	336000.00	537.99	0.0	539.14	761.02	9.99	0.18	592.14
443.07	430.00	0.0	0.0	515.40	487000.00	541.61	0.0	542.20	864.32	8.76	0.18	872.32
453.09	130.00	0.0	0.0	517.00	105600.00	526.70	0.0	530.26	205.99	8.37	0.22	198.17
453.09	130.00	0.0	0.0	517.00	315000.00	537.22	0.0	538.11	224.83	12.93	0.18	564.69
453.09	130.00	0.0	0.0	517.00	336000.00	537.75	0.0	539.39	224.88	13.82	0.18	606.37
453.09	130.00	0.0	0.0	517.00	487000.00	540.83	0.0	543.16	220.89	16.03	0.16	691.56
45.20	5.00	538.80	535.20	517.00	105600.00	526.55	0.0	530.29	184.70	20.66	0.22	198.38
45.20	5.00	538.80	535.20	517.00	315000.00	536.57	0.0	538.69	224.84	97.05	0.18	564.86
45.20	5.00	538.80	535.20	517.00	336000.00	536.90	0.0	539.82	224.85	114.01	0.18	606.75
45.20	5.00	538.80	535.20	517.00	487000.00	538.09	0.0	543.80	224.86	239.52	0.18	892.37
45.20	25.00	538.80	535.20	517.00	105600.00	526.61	0.0	530.36	184.77	20.25	0.22	199.38
45.20	25.00	538.80	535.20	517.00	315000.00	536.81	0.0	539.13	224.83	97.05	0.19	566.66
45.20	25.00	538.80	535.20	517.00	336000.00	537.18	0.0	539.90	224.85	114.01	0.18	608.35
45.20	25.00	538.80	535.20	517.00	487000.00	538.68	0.0	543.90	224.86	239.52	0.18	893.97
45.30	1.00	0.0	0.0	517.00	105600.00	526.61	0.0	530.36	184.77	20.24	0.22	199.40
45.30	1.00	0.0	0.0	517.00	315000.00	537.74	0.0	539.22	224.86	25.96	0.19	568.53
45.30	1.00	0.0	0.0	517.00	336000.00	538.42	0.0	540.02	224.86	26.54	0.18	610.43
45.30	1.00	0.0	0.0	517.00	487000.00	542.69	0.0	544.77	224.91	26.23	0.18	894.06
463.14	235.00	0.0	0.0	516.10	105600.00	530.06	0.0	530.78	206.74	16.87	0.23	208.91
463.14	235.00	0.0	0.0	516.10	315000.00	538.88	0.0	539.72	565.15	16.01	0.20	589.92
463.14	235.00	0.0	0.0	516.10	336000.00	539.69	0.0	540.53	568.56	13.46	0.19	633.56
463.14	235.00	0.0	0.0	516.10	487000.00	544.54	0.0	545.26	661.53	9.89	0.19	929.73
473.25	555.00	0.0	0.0	517.50	105600.00	530.91	0.0	531.56	173.69	11.77	0.26	232.52
473.25	555.00	0.0	0.0	517.50	315000.00	539.77	0.0	540.60	492.00	14.45	0.21	651.68
473.25	555.00	0.0	0.0	517.50	336000.00	540.64	0.0	541.40	455.48	14.97	0.21	700.40
473.25	555.00	0.0	0.0	517.50	487000.00	544.66	0.0	545.49	559.96	12.11	0.21	1030.51

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF RDWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE (CFS)	CWSEL	CRIWS	EG	TOPWID	LOWS	TIME	VOL
683.29	230.00	0.0	0.0	517.00	105400.00	530.86	0.0	531.97	131.42	16.70	0.27	241.37
683.29	230.00	0.0	0.0	517.00	31600.00	538.12	0.0	541.47	166.44	29.55	0.22	669.73
683.29	230.00	0.0	0.0	517.00	33600.00	538.66	0.0	542.39	177.00	31.55	0.21	719.82
683.29	230.00	0.0	0.0	517.00	48700.00	542.65	536.14	547.10	413.97	36.57	0.21	1058.51
68.10	5.00	539.60	535.50	517.00	105400.00	530.67	0.0	531.98	131.97	16.67	0.27	241.53
68.10	5.00	539.60	535.50	517.00	31600.00	538.68	0.0	541.86	161.89	140.84	0.22	669.99
68.10	5.00	539.60	535.50	517.00	33600.00	538.76	0.0	542.63	161.89	165.46	0.21	720.09
68.10	5.00	539.60	535.50	517.00	48700.00	535.97	536.64	548.76	161.66	367.59	0.21	1058.89
68.20	25.00	539.60	535.50	517.00	105400.00	530.92	0.0	532.02	131.97	16.66	0.27	242.37
68.20	25.00	539.60	535.50	517.00	31600.00	537.03	0.0	541.21	162.56	140.84	0.22	671.12
68.20	25.00	539.60	535.50	517.00	33600.00	537.18	0.0	543.26	165.26	165.46	0.21	721.22
68.20	25.00	539.60	535.50	517.00	48700.00	536.84	536.84	549.83	161.89	367.59	0.21	1060.82
68.25	1.00	0.0	0.0	517.00	105400.00	530.93	0.0	532.02	131.97	16.65	0.27	242.41
68.25	1.00	0.0	0.0	517.00	31600.00	534.76	0.0	542.44	149.89	22.42	0.22	671.18
68.25	1.00	0.0	0.0	517.00	33600.00	540.73	0.0	543.59	147.74	22.14	0.21	721.28
68.25	1.00	0.0	0.0	517.00	48700.00	545.09	536.16	550.74	479.25	10.82	0.21	1060.92
68.30	620.00	0.0	0.0	517.00	105400.00	532.01	0.0	532.52	132.95	12.15	0.29	266.06
68.30	620.00	0.0	0.0	517.00	31600.00	541.54	0.0	543.70	178.98	18.92	0.23	713.62
68.30	620.00	0.0	0.0	517.00	33600.00	542.68	0.0	544.81	415.09	15.72	0.23	768.66
68.30	620.00	0.0	0.0	517.00	48700.00	549.88	0.0	551.29	683.60	0.46	0.23	1155.91
493.62	10.00	0.0	0.0	521.60	105400.00	532.87	532.87	535.12	182.40	176.76	0.29	266.55
493.62	10.00	0.0	0.0	521.60	31600.00	542.11	0.0	543.78	287.03	41.26	0.23	715.54
493.62	10.00	0.0	0.0	521.60	33600.00	543.29	0.0	544.85	306.39	35.82	0.23	769.46
493.62	10.00	0.0	0.0	521.60	48700.00	550.76	0.0	551.44	678.23	20.01	0.23	1157.41
50.35	540.00	0.0	0.0	525.10	105400.00	536.33	0.0	536.84	252.56	11.24	0.32	283.05
50.35	540.00	0.0	0.0	525.10	31600.00	543.50	0.0	544.98	328.66	12.67	0.25	757.21
50.35	540.00	0.0	0.0	525.10	33600.00	544.91	0.0	545.95	357.66	12.26	0.25	818.64
50.35	540.00	0.0	0.0	525.10	48700.00	551.12	0.0	552.05	670.96	8.13	0.25	1239.78
515.65	680.00	0.0	0.0	525.80	105400.00	537.22	0.0	537.87	238.21	19.79	0.35	312.45
513.65	643.00	0.0	0.0	525.80	31600.00	544.83	0.0	546.08	276.04	19.83	0.27	820.98
513.65	680.00	0.0	0.0	525.80	33600.00	545.78	0.0	547.05	269.20	18.81	0.27	889.43
513.65	680.00	0.0	0.0	529.80	48700.00	551.58	0.0	552.81	339.23	33.39	0.28	1360.66
520.80	790.00	0.0	0.0	522.80	105400.00	538.28	0.0	538.74	319.60	6.69	0.39	349.78
523.60	790.00	0.0	0.0	522.80	31600.00	546.23	0.0	546.89	471.19	6.96	0.31	902.62
523.60	790.00	0.0	0.0	522.80	33600.00	547.16	0.0	547.93	475.24	6.89	0.30	973.65
523.60	790.00	0.0	0.0	522.80	48700.00	552.75	0.0	553.42	525.74	6.95	0.31	1471.50
533.42	660.00	0.0	0.0	526.20	105400.00	538.62	0.0	539.42	176.96	13.12	0.42	380.29
533.42	660.00	0.0	0.0	526.20	31600.00	546.10	0.0	547.01	470.66	18.52	0.33	972.89
533.42	660.00	0.0	0.0	526.20	33600.00	547.05	0.0	548.00	511.93	17.45	0.32	1150.32
533.42	660.00	0.0	0.0	526.20	48700.00	552.81	0.0	554.02	834.97	10.98	0.38	1595.88

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF ROADWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE CFS	CWSEL	CRWS	EG	TOPWID	EOKOS	TIME	VOL
53.10	540.00	0.0	0.0	525.00	10560.00	539.65	0.0	539.96	142.96	6.98	0.46	602.66
53.10	540.00	0.0	0.0	525.00	31600.00	547.62	0.0	548.70	499.97	10.63	0.39	1022.93
53.10	540.00	0.0	0.0	525.00	33600.00	548.29	0.0	549.56	499.99	10.81	0.39	1106.62
53.10	540.00	0.0	0.0	525.00	48700.00	553.40	0.0	554.51	500.00	7.74	0.35	1688.92
53.20	5.00	544.80	560.20	525.00	10560.00	539.66	0.0	539.96	142.96	6.97	0.46	602.87
53.20	5.00	544.80	560.20	525.00	31600.00	547.11	0.0	548.80	499.98	61.76	0.39	1023.38
53.20	5.00	544.80	560.20	525.00	33600.00	548.18	0.0	549.60	499.98	65.18	0.39	1106.50
53.20	5.00	544.80	560.20	525.00	48700.00	553.66	0.0	554.54	500.00	27.18	0.35	1684.71
53.30	15.00	544.80	560.20	525.00	10560.00	539.67	0.0	539.97	142.96	6.95	0.46	603.52
53.30	15.00	544.80	560.20	525.00	31600.00	547.38	0.0	548.53	499.97	73.91	0.39	1024.53
53.30	15.00	544.80	560.20	525.00	33600.00	548.35	0.0	549.70	499.99	61.36	0.39	1107.84
53.30	15.00	544.80	560.20	525.00	48700.00	553.71	0.0	554.58	500.00	26.88	0.35	1691.99
544.32	1.00	0.0	0.0	525.00	10560.00	539.67	0.0	539.97	142.96	6.95	0.46	603.57
544.32	1.00	0.0	0.0	525.00	31600.00	547.76	0.0	548.96	498.97	9.00	0.39	1024.62
544.32	1.00	0.0	0.0	525.00	33600.00	548.65	0.0	549.72	476.99	9.87	0.38	1107.99
544.32	1.00	0.0	0.0	525.00	48700.00	553.59	0.0	554.63	500.00	7.55	0.35	1692.69
56.10	100.00	0.0	0.0	526.50	10560.00	539.39	0.0	540.09	140.96	8.96	0.45	607.66
56.10	100.00	0.0	0.0	526.50	31600.00	547.36	0.0	549.21	313.39	16.15	0.35	1031.69
56.10	100.00	0.0	0.0	526.50	33600.00	548.02	0.0	549.98	325.36	14.65	0.34	1112.61
56.10	100.00	0.0	0.0	526.50	48700.00	552.88	0.0	554.92	341.95	12.72	0.36	1700.41
56.20	5.00	544.00	539.40	526.50	10560.00	539.39	0.0	540.09	140.96	8.90	0.45	607.66
56.20	5.00	544.00	539.40	526.50	31600.00	545.76	539.40	549.03	265.27	193.85	0.35	1033.75
56.20	5.00	544.00	539.40	526.50	33600.00	546.76	0.0	550.52	304.99	167.81	0.34	1117.76
56.20	5.00	544.00	539.40	526.50	48700.00	552.98	0.0	554.96	341.96	84.13	0.36	1706.97
56.30	25.00	544.00	539.40	526.50	10560.00	539.63	0.0	540.13	140.96	22.36	0.45	608.83
56.30	25.00	544.00	539.40	526.50	31600.00	547.75	0.0	552.14	320.00	106.02	0.35	1035.19
56.30	25.00	544.00	539.40	526.50	33600.00	548.30	0.0	550.76	330.81	106.12	0.34	1119.33
56.30	25.00	544.00	539.40	526.50	48700.00	553.22	0.0	555.10	341.98	84.68	0.36	1709.62
554.05	1.00	0.0	0.0	526.50	10560.00	539.63	0.0	540.13	140.96	8.96	0.45	608.87
554.05	1.00	0.0	0.0	526.50	31600.00	548.72	0.0	550.22	338.96	10.92	0.35	1035.26
554.05	1.00	0.0	0.0	526.50	33600.00	549.24	0.0	550.86	341.96	11.72	0.34	1119.41
554.05	1.00	0.0	0.0	526.50	48700.00	553.15	0.0	555.12	341.96	12.17	0.36	1709.76
564.09	211.00	0.0	0.0	526.80	10560.00	539.87	0.0	540.35	204.96	9.91	0.46	617.83
564.09	211.00	0.0	0.0	526.80	31600.00	549.86	0.0	551.51	368.76	8.08	0.36	1057.18
564.09	211.00	0.0	0.0	526.80	33600.00	550.45	0.0	551.19	369.36	8.93	0.35	1142.16
564.09	211.00	0.0	0.0	526.80	48700.00	554.59	0.0	555.44	396.00	8.53	0.36	1739.00
574.19	525.00	0.0	0.0	523.80	10560.00	540.36	0.0	540.66	329.76	8.97	0.49	646.03
574.19	525.00	0.0	0.0	523.80	31600.00	550.27	0.0	550.88	336.53	6.26	0.36	1122.46
574.19	525.00	0.0	0.0	528.80	33600.00	550.87	0.0	551.54	337.21	6.59	0.38	1210.54
574.19	525.00	0.0	0.0	528.80	48700.00	554.98	0.0	555.85	362.60	7.13	0.38	1826.30

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF ROADWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE	CWSEL	CRWS	EG	TOPWID	LOKOS	TIME	VOL
586.27	420.00	0.0	0.0	525.60	10560.00	540.89	0.0	541.12	371.42	6.36	0.52	670.90
586.27	420.00	0.0	0.0	525.60	31800.00	550.72	0.0	551.10	369.71	3.75	0.60	1183.57
586.27	420.00	0.0	0.0	525.60	33800.00	551.36	0.0	551.77	370.66	3.99	0.60	1273.60
586.27	420.00	0.0	0.0	525.60	46700.00	555.55	0.0	556.12	404.10	4.36	0.60	1903.93
594.36	430.00	0.0	0.0	526.60	10560.00	541.13	0.0	541.30	837.24	3.33	0.56	510.40
594.36	430.00	0.0	0.0	526.60	31800.00	551.15	0.0	551.20	1492.12	0.76	0.67	1315.97
594.36	430.00	0.0	0.0	526.60	33800.00	551.82	0.0	551.84	1509.66	0.76	0.67	1412.56
594.36	430.00	0.0	0.0	526.60	46700.00	556.18	0.0	556.23	1609.00	0.82	0.67	2089.66
6.55	1020.00	0.0	0.0	520.70	10560.00	540.81	0.0	542.25	106.34	20.67	0.59	572.04
6.55	1020.00	0.0	0.0	520.70	31800.00	551.26	0.0	551.28	1511.79	0.57	0.68	1676.66
6.55	1020.00	0.0	0.0	520.70	33800.00	551.91	0.0	551.95	1515.22	0.61	.66	1770.65
6.55	1020.00	0.0	0.0	520.70	46700.00	556.25	0.0	556.29	1752.82	0.76	0.59	2636.13
6.55	1.00	544.41	539.40	520.70	10560.00	540.50	0.0	542.33	106.66	22.15	0.59	572.06
6.55	1.00	544.41	539.40	520.70	31800.00	551.25	0.0	551.28	1511.79	0.56	0.68	1676.98
6.55	1.00	544.41	539.40	520.70	33800.00	551.92	0.0	551.95	1515.22	0.59	0.66	1767.18
6.55	1.00	544.41	539.40	520.70	46700.00	556.25	0.0	556.29	1752.82	0.75	0.64	2636.01
614.55	20.00	544.41	539.40	520.70	10560.00	540.64	0.0	542.67	107.52	22.12	0.59	572.53
614.55	20.00	544.41	539.40	520.70	31800.00	551.25	0.0	551.28	1511.80	0.60	0.68	1662.61
614.55	20.00	544.41	539.40	520.70	33800.00	551.92	0.0	551.95	1515.22	0.59	0.66	1833.49
614.55	20.00	544.41	539.40	520.70	46700.00	556.25	0.0	556.29	1752.83	0.75	0.64	2646.08
6.55	1.00	0.0	0.0	520.70	10560.00	541.18	0.0	542.53	107.55	18.88	0.59	572.56
6.55	1.00	0.0	0.0	520.70	31800.00	551.25	0.0	551.28	1511.80	0.57	0.68	1693.11
6.55	1.00	0.0	0.0	520.70	33800.00	551.91	0.0	551.95	1515.23	0.61	0.66	1803.81
6.55	1.00	0.0	0.0	520.70	46700.00	556.25	0.0	556.30	1752.83	0.58	0.64	2646.58
624.73	950.00	0.0	0.0	527.60	10560.00	542.69	0.0	542.90	1023.26	0.96	0.39	658.70
624.73	950.00	0.0	0.0	527.60	31800.00	551.29	0.0	551.31	1468.00	0.16	0.96	2017.09
624.73	950.00	0.0	0.0	527.60	33800.00	551.97	0.0	551.99	1496.76	0.21	0.90	2180.39
624.73	950.00	0.0	0.0	527.60	46700.00	556.30	0.0	556.33	1690.67	0.27	0.82	3147.94
634.82	476.00	0.0	0.0	531.00	10560.00	542.91	0.0	542.96	1279.27	1.61	0.63	729.63
634.82	476.00	0.0	0.0	531.00	31800.00	551.36	0.0	551.52	1681.24	0.20	1.06	2212.31
634.82	476.00	0.0	0.0	531.00	33800.00	551.98	0.0	552.06	1717.61	0.23	1.05	2366.48
634.82	476.00	0.0	0.0	531.00	46700.00	556.32	0.0	556.35	1771.26	0.27	0.92	3430.39
6.92	543.00	0.0	0.0	536.60	10560.00	542.79	542.79	546.56	91.76	117.77	0.64	672.56
6.92	543.00	0.0	0.0	536.60	31800.00	551.11	0.0	551.60	1200.36	5.96	1.12	2158.05
6.92	543.00	0.0	0.0	536.60	33800.00	551.82	0.0	552.08	1298.68	5.53	1.07	2524.78
6.92	543.00	0.0	0.0	536.60	46700.00	556.27	0.0	556.40	2126.03	2.50	0.98	3682.43
6.92	1.00	556.50	549.10	536.60	10560.00	541.33	0.0	546.61	92.04	93.92	0.64	672.60
6.92	1.00	556.50	549.10	536.60	31800.00	551.23	0.0	551.61	1219.23	0.68	1.12	2158.17
6.92	1.00	556.50	549.10	536.60	33800.00	551.91	0.0	552.09	1306.80	8.87	1.07	2529.92
6.92	1.00	556.50	549.10	536.60	46700.00	556.29	0.0	556.40	2126.03	3.61	0.98	3682.73

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF ROADWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE (CFS)	CWSEL	CRIWS	EG	TOPWID	10KRS	TIME	VOL
644.93	35.00	554.50	549.10	536.40	10540.00	544.40	0.0	544.95	95.47	62.24	0.84	773.23
644.93	35.00	554.50	549.10	536.40	17000.00	551.27	0.0	551.45	1218.06	9.53	1.12	2362.36
644.93	35.00	554.50	549.10	536.40	19000.00	551.95	0.0	552.12	1308.71	8.75	1.07	2529.75
644.93	35.00	554.50	549.10	536.40	34700.00	556.31	0.0	556.42	2126.32	4.60	0.98	3643.31
6.93	1.00	0.0	0.0	536.40	10540.00	544.43	0.0	544.96	96.07	61.25	0.84	773.25
6.93	1.00	0.0	0.0	536.40	17000.00	551.20	0.0	551.47	1209.02	5.72	1.12	2362.48
6.93	1.00	0.0	0.0	536.40	19000.00	551.69	0.0	552.14	1304.19	5.36	1.07	2529.89
6.93	1.00	0.0	0.0	536.40	34700.00	556.29	0.0	556.42	2126.28	2.47	0.98	3643.62
655.03	528.00	0.0	0.0	539.40	10540.00	548.60	0.0	549.60	646.94	37.24	0.86	941.05
655.03	528.00	0.0	0.0	539.40	17000.00	551.49	0.0	552.01	1106.16	17.95	1.15	2423.93
655.03	528.00	0.0	0.0	539.40	19000.00	552.15	0.0	552.65	1153.61	16.99	1.10	2601.04
655.03	528.00	0.0	0.0	539.40	34700.00	556.36	0.0	556.68	1240.59	9.20	1.02	3841.67
665.19	845.00	0.0	0.0	547.00	10540.00	552.81	0.0	556.62	251.55	100.29	0.88	822.34
665.19	845.00	0.0	0.0	547.00	17000.00	554.19	554.19	558.97	299.52	117.05	1.17	2484.92
665.19	845.00	0.0	0.0	547.00	19000.00	554.82	554.82	557.78	322.27	112.67	1.12	2671.19
665.19	845.00	0.0	0.0	547.00	34700.00	558.50	558.50	561.26	456.96	68.96	1.06	3979.55
675.35	845.00	0.0	0.0	548.70	10540.00	559.30	559.30	562.82	151.39	86.37	0.90	851.31
675.35	845.00	0.0	0.0	548.70	17000.00	562.26	562.26	566.55	166.38	81.11	1.18	2511.79
675.35	845.00	0.0	0.0	548.70	19000.00	563.26	563.26	567.61	170.65	83.08	1.13	2701.50
675.35	845.00	0.0	0.0	548.70	34700.00	568.95	568.95	573.04	428.86	59.49	1.05	4061.60
685.51	845.00	0.0	0.0	558.00	10540.00	567.13	0.0	568.59	199.40	51.79	0.92	861.44
685.51	845.00	0.0	0.0	558.00	17000.00	570.01	0.0	571.77	213.17	49.53	1.20	2541.71
685.51	845.00	0.0	0.0	558.00	19000.00	571.03	0.0	572.88	217.70	42.17	1.16	2735.21
685.51	845.00	0.0	0.0	558.00	34700.00	576.68	0.0	577.52	261.85	48.78	1.07	4096.55

SECTION NUMBER	DISCHARGE CFS	CWSEL	CWSEL DIFF EACH Q	CWSEL DIFF EACH SECTION	CWSEL-WSELK	TOPWID	TOPW. DIFF	LENGTH
212.050	10540.000	513.231	0.0	0.0	0.0	130.926	0.0	0.0
212.050	31000.000	519.707	6.476	0.0	0.0	140.920	-9.994	0.0
212.050	33600.000	520.523	0.816	0.0	0.0	158.345	-27.419	0.0
212.050	48700.000	525.222	4.699	0.0	0.0	304.513	-173.588	0.0
222.070	10540.000	516.324	0.0	3.087	0.0	185.491	0.0	110.000
222.070	31000.000	525.284	8.960	5.577	0.0	186.036	-0.545	110.000
222.070	33600.000	526.185	0.901	5.662	0.0	186.480	-0.989	110.000
222.070	48700.000	530.418	4.233	5.196	0.0	280.977	-95.486	110.000
232.090	10540.000	516.250	0.0	-0.073	0.0	157.908	0.0	100.000
232.090	31000.000	524.964	8.713	-0.320	0.0	179.783	-21.875	100.000
232.090	33600.000	525.840	0.877	-0.345	0.0	182.972	-25.064	100.000
232.090	48700.000	530.153	4.313	-0.264	0.0	422.497	-264.589	100.000
242.100	10540.000	515.785	0.0	-0.466	0.0	156.762	0.0	60.000
242.100	31000.000	524.460	8.675	-0.504	0.0	174.670	-19.908	60.000
242.100	33600.000	525.329	0.869	-0.511	0.0	177.806	-21.044	60.000
242.100	48700.000	529.310	3.981	-0.843	0.0	192.178	-37.416	60.000
24.100	10540.000	516.890	0.0	1.104	0.0	149.248	0.0	10.000
24.100	31000.000	529.254	12.364	4.794	0.0	371.087	-221.846	10.000
24.100	33600.000	529.684	0.430	4.355	0.0	379.615	-230.376	10.000
24.100	48700.000	531.756	2.073	2.446	0.0	452.000	-302.759	10.000
252.110	10540.000	516.720	0.0	-0.170	0.0	144.878	0.0	10.000
252.110	31000.000	528.868	12.148	-0.386	0.0	364.469	-219.591	10.000
252.110	33600.000	529.188	0.320	-0.496	0.0	370.137	-225.259	10.000
252.110	48700.000	530.452	1.265	-1.304	0.0	401.291	-256.413	10.000

262.120	10540.000	518.708	0.0	1.989	0.0	132.256	0.0	100.000
262.120	31000.000	527.730	8.992	-1.168	0.0	161.950	-9.696	100.000
262.120	33600.000	527.718	0.018	-1.470	0.0	161.950	-9.696	100.000
262.120	48700.000	533.511	2.193	0.658	0.0	346.433	-213.677	100.000
26.300	10540.000	519.231	0.0	0.523	0.0	133.422	0.0	41.000
26.300	31000.000	524.950	9.769	1.260	0.0	189.256	-55.834	41.000
26.300	33600.000	525.896	-0.034	1.228	0.0	187.365	-53.662	41.000
26.300	48700.000	533.671	1.725	0.160	0.0	356.773	-223.151	41.000
272.150	10540.000	521.388	0.0	2.155	0.0	181.206	0.0	130.000
272.150	31000.000	531.010	8.624	2.030	0.0	297.036	-115.831	130.000
272.150	33600.000	531.472	0.462	2.526	0.0	305.533	-124.330	130.000
272.150	48700.000	535.546	4.074	4.175	0.0	331.945	-150.761	130.000
282.170	10540.000	521.771	0.0	0.384	0.0	193.441	0.0	100.000
282.170	31000.000	531.686	9.914	0.674	0.0	399.836	-206.395	100.000
282.170	33600.000	532.251	0.567	0.779	0.0	399.841	-206.399	100.000
282.170	48700.000	536.572	4.321	1.026	0.0	399.879	-206.438	100.000
312.230	10540.000	522.734	0.0	0.967	0.0	199.683	0.0	300.000
312.230	31000.000	532.224	9.488	0.960	0.0	484.839	-285.158	300.000
312.230	33600.000	532.827	0.602	0.376	0.0	484.846	-285.169	300.000
312.230	48700.000	537.170	4.343	0.598	0.0	484.883	-285.205	300.000
352.310	10540.000	523.576	0.0	0.858	0.0	197.450	0.0	400.000
352.310	31000.000	532.517	8.920	0.293	0.0	618.016	-420.568	400.000
352.310	33600.000	533.126	0.610	0.299	0.0	618.220	-420.770	400.000
352.310	48700.000	537.455	4.329	0.285	0.0	619.650	-422.200	400.000
362.390	10540.000	524.459	0.0	0.883	0.0	189.298	0.0	430.000
362.390	31000.000	532.737	8.277	0.220	0.0	503.525	-313.626	430.000
362.390	33600.000	533.318	0.581	0.192	0.0	518.353	-328.457	430.000
362.390	48700.000	537.481	4.163	0.026	0.0	567.770	-377.873	430.000
372.440	10540.000	524.983	0.0	0.521	0.0	186.595	0.0	300.000
372.440	31000.000	533.049	8.059	0.303	0.0	440.589	-253.994	300.000
372.440	33600.000	533.617	0.572	0.299	0.0	444.595	-258.000	300.000
372.440	48700.000	537.606	3.995	0.126	0.0	528.735	-342.140	300.000
382.540	10540.000	525.670	0.0	0.689	0.0	166.065	0.0	500.000
382.540	31000.000	533.844	8.174	0.404	0.0	594.801	-428.736	500.000
382.540	33600.000	534.496	0.652	0.265	0.0	609.577	-443.512	500.000
382.540	48700.000	538.655	4.169	1.659	0.0	690.986	-524.921	500.000
392.650	10540.000	526.744	0.0	1.076	0.0	194.444	0.0	650.000
392.650	31000.000	535.078	8.333	1.236	0.0	630.034	-435.590	650.000
392.650	33600.000	535.726	0.648	1.229	0.0	657.316	-462.872	650.000
392.650	48700.000	539.613	3.887	0.948	0.0	733.813	-539.369	650.000
39.100	10540.000	526.760	0.0	0.016	0.0	194.512	0.0	10.000
39.100	31000.000	534.791	8.031	-0.287	0.0	617.912	-423.399	10.000
39.100	33500.000	535.612	0.821	-0.119	0.0	652.467	-457.955	10.000
39.100	48700.000	539.767	4.155	0.154	0.0	733.815	-539.303	10.000
39.200	10540.000	526.775	0.0	0.015	0.0	194.576	0.0	10.000
39.200	31000.000	534.838	8.083	0.067	0.0	620.740	-426.164	10.000
39.200	33600.000	535.722	0.884	0.111	0.0	657.120	-462.544	10.000
39.200	48700.000	539.813	4.091	0.047	0.0	733.816	-539.240	10.000
39.300	10540.000	526.776	0.0	0.001	0.0	194.583	0.0	1.000
39.300	31000.000	535.312	8.535	0.454	0.0	639.942	-445.359	1.000
39.300	33600.000	535.907	0.596	0.185	0.0	664.862	-470.299	1.000
39.300	48700.000	539.721	3.814	-0.092	0.0	733.816	-539.232	1.000

402.730	10540.000	527.131	0.0	0.355	0.0	187.237	0.0	360.000
402.780	31600.000	535.268	8.136	-0.044	0.0	609.599	-432.362	360.000
402.780	33600.000	535.857	0.590	-0.050	0.0	657.780	-666.563	360.000
402.830	48700.000	539.868	3.816	-0.053	0.0	661.132	-683.895	360.000
412.830	10540.000	527.915	0.0	0.384	0.0	180.923	0.0	510.000
412.830	31600.000	536.268	8.381	1.028	0.0	574.415	-393.492	510.000
412.830	33600.000	536.849	0.613	1.642	0.0	577.756	-3%0.833	510.000
412.830	48700.000	540.464	3.565	0.817	0.0	618.667	-635.744	510.000
422.910	10540.000	529.622	0.0	0.767	0.0	261.301	0.0	405.000
422.910	31600.000	536.818	8.188	0.514	0.0	574.809	-818.308	405.000
422.910	33600.000	537.034	0.216	0.515	0.0	614.536	-358.238	405.000
422.910	48700.000	540.471	3.556	0.686	0.0	671.330	-610.030	405.000
432.990	10540.000	528.435	0.0	0.318	0.0	322.941	0.0	425.000
432.990	31600.000	537.039	8.604	0.229	0.0	739.888	-416.895	425.000
432.990	33600.000	537.034	0.615	0.240	0.0	755.355	-43..366	425.000
432.990	48700.000	541.256	3.804	0.287	0.0	780.425	-457.453	425.000
443.070	10540.000	529.340	0.0	0.455	0.0	258.306	0.0	430.000
443.070	31600.000	537.167	7.977	0.327	0.0	740.796	-482.486	430.000
443.070	33600.000	537.236	0.827	0.340	0.0	761.016	-522.758	430.000
443.070	48700.000	541.613	3.819	0.355	0.0	844.524	-586.216	430.000
453.090	10540.000	529.647	0.0	0.307	0.0	205.939	0.0	130.000
453.090	31600.000	537.225	7.523	-0.442	0.0	220.852	-14.912	130.000
453.090	33600.000	537.250	0.546	-0.248	0.0	220.857	-14.918	130.000
453.090	48700.000	540.627	2.877	-0.986	0.0	220.840	-14.951	130.000
45.100	10540.000	529.548	0.0	-0.149	0.0	184.703	0.0	5.000
45.100	31600.000	536.572	7.023	-0.693	0.0	220.843	-36.140	5.000
45.100	33600.000	536.644	0.328	-0.853	0.0	220.847	-36.144	5.000
45.100	48700.000	538.046	1.188	-2.541	0.0	220.861	-36.158	5.000
45.200	10540.000	529.611	0.0	0.043	0.0	184.768	0.0	25.000
45.200	31600.000	536.614	7.203	0.242	0.0	220.846	-36.078	25.000
45.200	33600.000	537.183	0.569	0.285	0.0	220.850	-36.082	25.000
45.200	48700.000	538.695	1.502	0.599	0.0	220.868	-36.100	25.000
45.300	10540.000	529.611	0.0	0.002	0.0	184.770	0.0	1.000
45.300	31600.000	537.732	8.119	0.918	0.0	220.857	-36.087	1.000
45.300	33600.000	538.076	0.342	1.261	0.0	220.865	-36.096	1.000
45.300	48700.000	542.669	4.593	4.604	0.0	220.915	-36.146	1.000
463.160	10540.000	530.036	0.0	0.435	0.0	204.725	0.0	235.000
463.160	31600.000	538.350	8.823	1.128	0.0	965.167	-3%0.422	235.000
463.160	33600.000	539.038	0.826	1.262	0.0	991.573	-3%0.853	235.000
463.160	48700.000	544.542	4.855	1.853	0.0	881.533	-450.808	235.000
473.250	10540.000	530.936	0.0	0.869	0.0	173.488	0.0	555.000
473.250	31600.000	539.269	8.744	0.409	0.0	442.664	-269.776	555.000
473.250	33600.000	540.042	0.773	0.356	0.0	455.477	-281.989	555.000
473.250	48700.000	544.664	4.622	0.422	0.0	559.959	-386.471	555.000
483.290	10540.000	530.882	0.0	-0.043	0.0	131.964	0.0	230.000
483.290	31600.000	538.119	7.237	-1.350	0.0	366.118	-34.150	230.000
483.290	33600.000	538.638	0.520	-1.383	0.0	177.796	-45.828	230.000
483.290	48700.000	542.435	3.776	-2.229	0.0	413.470	-281.502	230.000
48.100	10540.000	530.872	0.0	0.010	0.0	131.969	0.0	5.000
48.100	31600.000	538.674	5.803	-1.440	0.0	141.887	-9.918	5.000
48.100	33600.000	538.766	0.085	-1.445	0.0	141.890	-9.922	5.000
48.100	48700.000	535.975	-0.789	-0.459	0.0	141.857	-9.889	5.000
48.200	10540.000	530.923	0.0	0.091	0.0	131.972	0.0	25.000

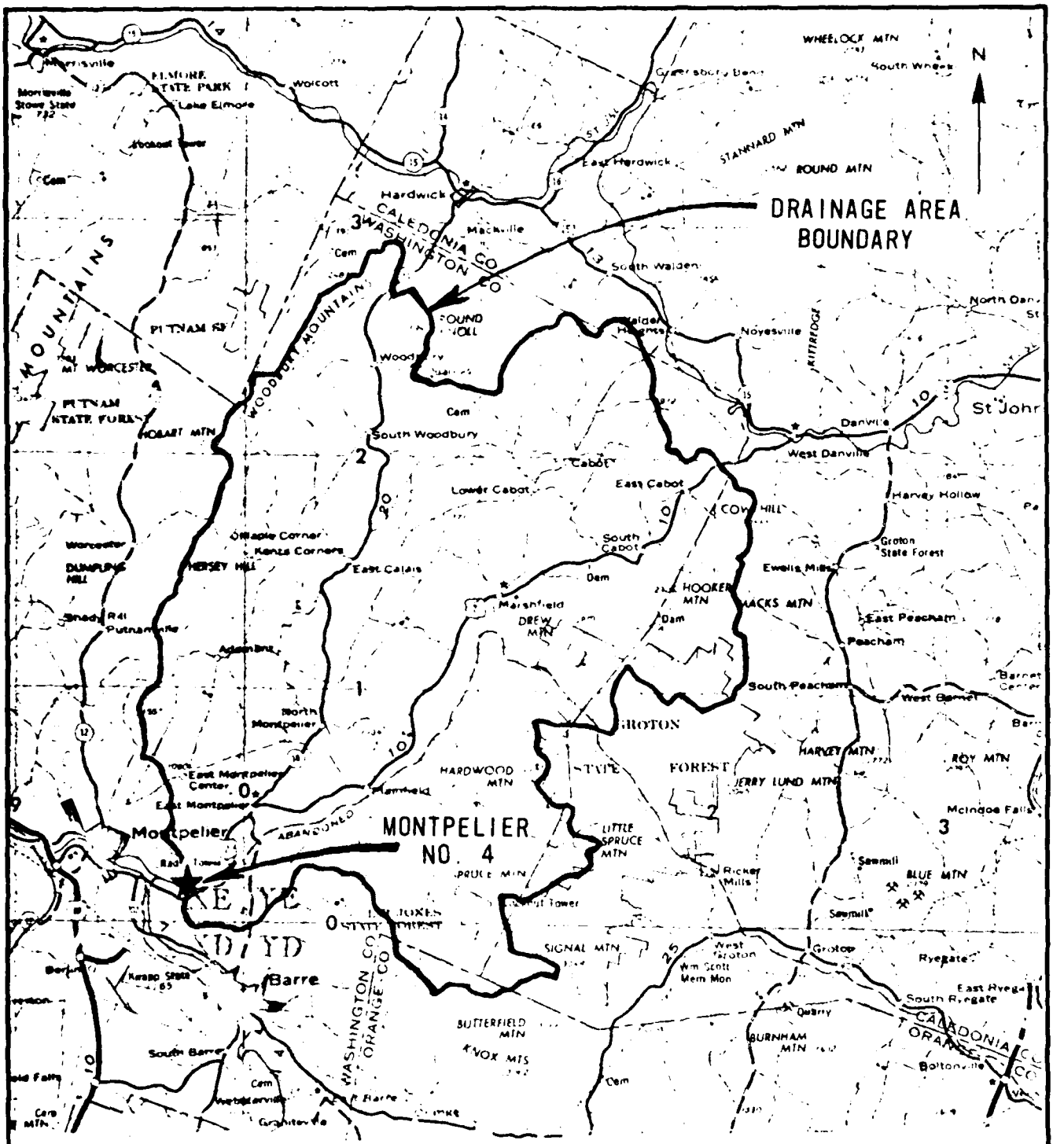
48.200	31600.000	537.031	6.108	0.352	0.0	162.581	-10.609	25.000
48.200	33600.000	537.178	3.147	0.414	0.0	165.744	-13.772	25.000
48.200	48700.000	536.564	-0.334	0.269	0.0	162.899	-10.922	25.000
48.250	30540.000	530.925	0.0	0.002	0.0	131.972	0.0	1.000
48.250	31600.000	539.732	8.776	2.670	0.0	194.688	-62.717	1.000
48.250	33600.000	540.731	1.030	3.553	0.0	197.721	-65.749	1.000
48.250	48700.000	549.044	8.313	12.201	0.0	479.251	-347.280	1.000
48.300	30540.000	532.013	0.0	1.088	0.0	132.998	0.0	620.000
48.300	31600.000	541.535	9.522	1.634	0.0	378.683	-245.685	620.000
48.300	33600.000	542.677	1.142	1.998	0.0	615.099	-282.100	620.000
48.300	48700.000	549.878	7.201	0.836	0.0	468.898	-850.650	620.000
493.420	30540.000	532.867	0.0	0.856	0.0	182.198	0.0	10.000
493.420	31600.000	542.612	9.745	0.977	0.0	237.227	-235.629	10.000
493.420	33600.000	543.245	1.181	0.616	0.0	306.336	-422.139	10.000
493.420	48700.000	550.161	7.068	0.483	0.0	476.752	-290.555	10.000
50.352	30540.000	536.134	0.0	3.488	0.0	257.560	0.0	560.000
50.352	31600.000	543.878	7.563	1.786	0.0	326.676	-69.115	560.000
50.352	33600.000	544.937	1.059	1.416	0.0	357.482	-99.902	560.000
50.352	48700.000	551.115	6.208	0.756	0.0	470.938	-213.378	560.000
513.650	30540.000	537.716	0.0	0.884	0.0	235.506	0.0	680.000
513.650	31600.000	544.693	7.015	0.535	0.0	274.006	-38.500	680.000
513.650	33600.000	545.760	0.967	0.873	0.0	289.198	-53.692	680.000
513.650	48700.000	551.543	5.606	0.468	0.0	334.231	-98.725	680.000
523.800	30540.000	538.278	0.0	1.061	0.0	319.405	0.0	790.000
523.800	31600.000	546.226	7.946	1.353	0.0	471.147	-151.742	790.000
523.800	33600.000	547.163	0.937	1.383	0.0	475.283	-155.878	790.000
523.800	48700.000	552.746	5.584	1.163	0.0	575.717	-256.312	790.000
533.920	30540.000	538.629	0.0	0.346	0.0	176.956	0.0	660.000
533.920	31600.000	546.134	7.504	-0.123	0.0	67..881	-299.923	660.000
533.920	33600.000	547.066	0.931	-0.116	0.0	531.934	-356.976	660.000
533.920	48700.000	552.419	5.353	0.467	0.0	839.972	-664.014	660.000
53.100	30540.000	539.496	0.0	0.830	0.0	242.957	0.0	540.000
53.100	31600.000	547.023	7.526	1.320	0.0	499.967	-257.008	540.000
53.100	33600.000	548.265	0.882	1.237	0.0	499.905	-257.028	540.000
53.100	48700.000	553.396	5.131	0.562	0.0	500.052	-257.095	540.000
53.200	30540.000	539.656	0.0	0.604	0.0	242.959	0.0	5.000
53.200	31600.000	547.187	7.529	-0.316	0.0	499.960	-257.001	5.000
53.200	33600.000	548.102	1.075	-0.105	0.0	499.983	-257.024	5.000
53.200	48700.000	553.565	5.463	0.269	0.0	500.055	-257.096	5.000
53.300	30540.000	539.669	0.0	0.011	0.0	242.962	0.0	15.000
53.300	31600.000	547.192	7.523	0.275	0.0	499.966	-257.004	15.000
53.300	33600.000	548.359	0.572	0.172	0.0	499.987	-257.025	15.000
53.300	48700.000	553.712	5.356	0.048	0.0	500.055	-257.094	15.000
544.020	30540.000	539.673	0.0	0.001	0.0	242.962	0.0	1.000
544.020	31600.000	547.766	8.094	0.382	0.0	499.976	-257.014	1.000
544.020	33600.000	548.488	0.722	0.132	0.0	499.990	-257.028	1.000
544.020	48700.000	553.538	5.050	-0.176	0.0	500.053	-257.092	1.000
54.100	30540.000	539.388	0.0	-0.082	0.0	140.364	0.0	100.000
54.100	31600.000	547.165	7.776	-0.400	0.0	313.389	-173.025	100.000
54.100	33600.000	548.017	0.851	-0.469	0.0	329.579	-189.215	100.000
54.100	48700.000	552.860	4.843	-0.656	0.0	381.955	-241.591	100.000
54.200	30540.000	539.393	0.0	0.005	0.0	140.362	0.0	5.000
54.200	31600.000	545.758	6.365	-1.608	0.0	283.292	-142.929	5.000

54.200	33600.000	546.760	1.006	-1.257	0.0	301.986	-161.616	5.000
54.200	48700.000	552.977	6.216	0.097	0.0	361.955	-201.588	5.000
54.300	10560.000	539.628	0.0	0.036	0.0	140.390	0.0	25.000
54.300	31600.000	547.753	8.331	2.002	0.0	320.598	-180.206	25.000
54.300	33600.000	548.336	0.546	1.546	0.0	330.612	-174.422	25.000
54.300	48700.000	553.218	4.914	0.241	0.0	361.958	-201.567	25.000
554.050	10560.000	539.632	0.0	0.004	0.0	140.391	0.0	1.000
554.050	31600.000	546.716	6.287	0.960	0.0	320.535	-180.144	1.000
554.050	33600.000	547.174	0.476	0.890	0.0	341.523	-201.532	1.000
554.050	48700.000	553.152	5.958	-0.665	0.0	361.957	-201.566	1.000
564.090	10560.000	539.866	0.0	0.435	0.0	204.545	0.0	211.000
564.090	31600.000	547.863	8.593	1.161	0.0	368.703	-186.120	211.000
564.090	33600.000	553.465	0.545	1.251	0.0	369.357	-186.776	211.000
564.090	48700.000	556.568	6.143	1.046	0.0	396.645	-186.662	211.000
574.190	10560.000	540.358	0.0	0.492	0.0	323.701	0.0	525.000
574.190	31600.000	550.271	9.912	0.411	0.0	536.510	-12.809	525.000
574.190	33600.000	552.672	0.402	0.417	0.0	537.508	-13.605	525.000
574.190	48700.000	554.978	4.104	0.388	0.0	562.598	-26.697	525.000
584.270	10560.000	540.855	0.0	0.527	0.0	371.122	0.0	420.000
584.270	31600.000	550.722	9.837	0.452	0.0	569.708	-10.586	420.000
584.270	33600.000	551.336	0.614	0.464	0.0	590.683	-17.742	420.000
584.270	48700.000	555.350	4.198	0.578	0.0	606.101	-36.979	420.000
594.360	10560.000	541.110	0.0	0.269	0.0	807.246	0.0	670.000
594.360	31600.000	551.148	10.018	0.424	0.0	1492.721	-669.515	670.000
594.360	33600.000	551.910	0.670	0.460	0.0	1504.412	-692.296	670.000
594.360	48700.000	556.167	4.354	0.612	0.0	1579.601	-840.795	670.000
6.548	10560.000	543.611	0.0	-0.319	0.0	104.395	0.0	1020.000
6.548	31600.000	553.242	10.431	0.295	0.0	1523.792	-1007.397	1020.000
6.548	33600.000	553.911	0.670	0.295	0.0	1514.917	-1013.524	1020.000
6.548	48700.000	558.265	4.336	0.274	0.0	1752.617	-1656.222	1020.000
6.549	10560.000	543.678	0.0	-0.313	0.0	101.881	0.0	1.000
6.549	31600.000	553.297	10.751	0.008	0.0	1511.792	-1410.132	1.000
6.549	33600.000	553.918	0.669	0.008	0.0	1514.917	-1413.297	1.000
6.549	48700.000	558.289	4.330	0.003	0.0	1752.617	-1656.958	1.000
616.550	10560.000	540.666	0.0	0.146	0.0	102.916	0.0	20.000
616.550	31600.000	550.751	10.803	0.002	0.0	1511.792	-1408.883	20.000
616.550	33600.000	551.423	0.669	0.002	0.0	1514.925	-1412.009	20.000
616.550	48700.000	556.253	4.330	0.001	0.0	1752.632	-1665.716	20.000
6.551	10560.000	544.176	0.0	0.532	0.0	107.533	0.0	1.000
6.551	31600.000	553.265	10.089	-0.006	0.0	1511.792	-1408.287	1.000
6.551	33600.000	553.934	0.669	-0.006	0.0	1514.925	-1411.392	1.000
6.551	48700.000	558.267	4.333	-0.003	0.0	1752.632	-1665.100	1.000
626.730	10560.000	542.851	0.0	1.675	0.0	1023.259	0.0	950.000
626.730	31600.000	551.293	8.442	0.648	0.0	1661.060	-434.761	950.000
626.730	33600.000	551.956	0.671	0.652	0.0	1666.784	-443.525	950.000
626.730	48700.000	556.269	4.333	0.652	0.0	1690.875	-482.818	950.000
636.820	10560.000	542.913	0.0	0.660	0.0	1075.276	0.0	476.000
636.820	31600.000	551.605	8.394	0.612	0.0	1680.276	-603.000	476.000
636.820	33600.000	552.279	0.675	0.614	0.0	1717.614	-642.339	476.000
636.820	48700.000	556.319	4.339	0.620	0.0	1771.758	-956.486	476.000
6.923	10560.000	547.792	0.0	-0.419	0.0	91.735	0.0	563.000
6.923	31600.000	557.127	8.345	-0.178	0.0	1200.377	-1108.642	563.000
6.923	33600.000	557.822	0.695	-0.158	0.0	1298.869	-1207.134	563.000

4.923	34700.000	556.269	4.443	-0.050	0.0	2326.031	-2036.295	543.000
4.923	10540.000	543.333	0.0	0.541	0.0	92.011	0.0	1.000
4.923	17600.000	551.234	7.401	0.107	0.0	1214.650	-1122.040	1.000
4.923	19600.000	551.914	0.646	0.093	0.0	1306.603	-1214.592	1.000
4.923	34700.000	556.293	4.379	0.625	0.0	2326.230	-2036.219	1.000
644.910	10540.000	544.401	0.0	1.068	0.0	95.867	0.0	35.000
644.910	17600.000	551.270	6.865	0.036	0.0	1218.061	-1122.194	35.000
644.910	19600.000	551.967	0.678	0.033	0.0	1308.710	-1212.866	35.000
644.930	34700.000	556.306	4.356	0.013	0.0	2326.316	-2031.449	35.000
4.930	10540.000	544.435	0.0	0.034	0.0	96.073	0.0	1.000
4.930	17600.000	551.199	6.765	-0.070	0.0	1209.022	-1112.949	1.000
4.930	19600.000	551.885	0.686	-0.062	0.0	1304.194	-1208.121	1.000
4.930	34700.000	556.269	4.404	-0.017	0.0	2326.260	-2031.187	1.000
655.030	10540.000	544.835	0.0	4.170	0.0	444.976	0.0	528.000
655.030	17600.000	551.943	2.888	0.293	0.0	1116.137	-619.161	528.000
655.030	19600.000	552.151	0.658	0.246	0.0	1153.636	-666.634	528.000
655.030	34700.000	556.306	4.213	0.675	0.0	2326.536	-599.560	528.000
665.190	10540.000	552.813	0.0	4.208	0.0	251.555	0.0	845.000
665.190	17600.000	554.143	1.377	2.696	0.0	299.918	-48.363	845.000
665.190	19600.000	554.618	0.429	2.488	0.0	322.213	-70.658	845.000
665.190	34700.000	556.693	3.680	2.135	0.0	744.962	-493.387	845.000
675.350	10540.000	554.832	0.0	6.489	0.0	131.355	0.0	845.000
675.350	17600.000	562.260	7.935	8.650	0.0	160.564	-29.209	845.000
675.350	19600.000	563.235	0.995	8.436	0.0	170.452	-39.097	845.000
675.350	34700.000	564.932	5.718	10.453	0.0	428.878	-296.523	845.000
685.510	10540.000	567.124	0.0	7.828	0.0	196.775	0.0	845.000
685.510	17600.000	570.007	2.878	7.367	0.0	213.771	-16.996	845.000
685.510	19600.000	571.029	1.022	7.196	0.0	217.696	-20.920	845.000
685.510	34700.000	574.675	3.646	5.723	0.0	261.350	-64.575	845.000

DATA FOR LAST CROSS SECTION

PROFILE	TYPE ENC	TARGET	TOP WIDTH AREA-ACRES	TOP WIDTH AREA-DIFF
1	0.0	0.0	126.288	0.0
2	0.0	0.0	272.973	146.709
3	0.0	0.0	284.563	158.275
4	0.0	0.0	337.059	210.791



SOURCE OF MAP

U.S. GEOLOGICAL SURVEY
LAKE CHAMPLAIN
N... V... N... ...AN.
SERIES V 101
... 000 1972

DUFRESNE-HENRY ENGINEERING CORP. ARCHITECT-ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

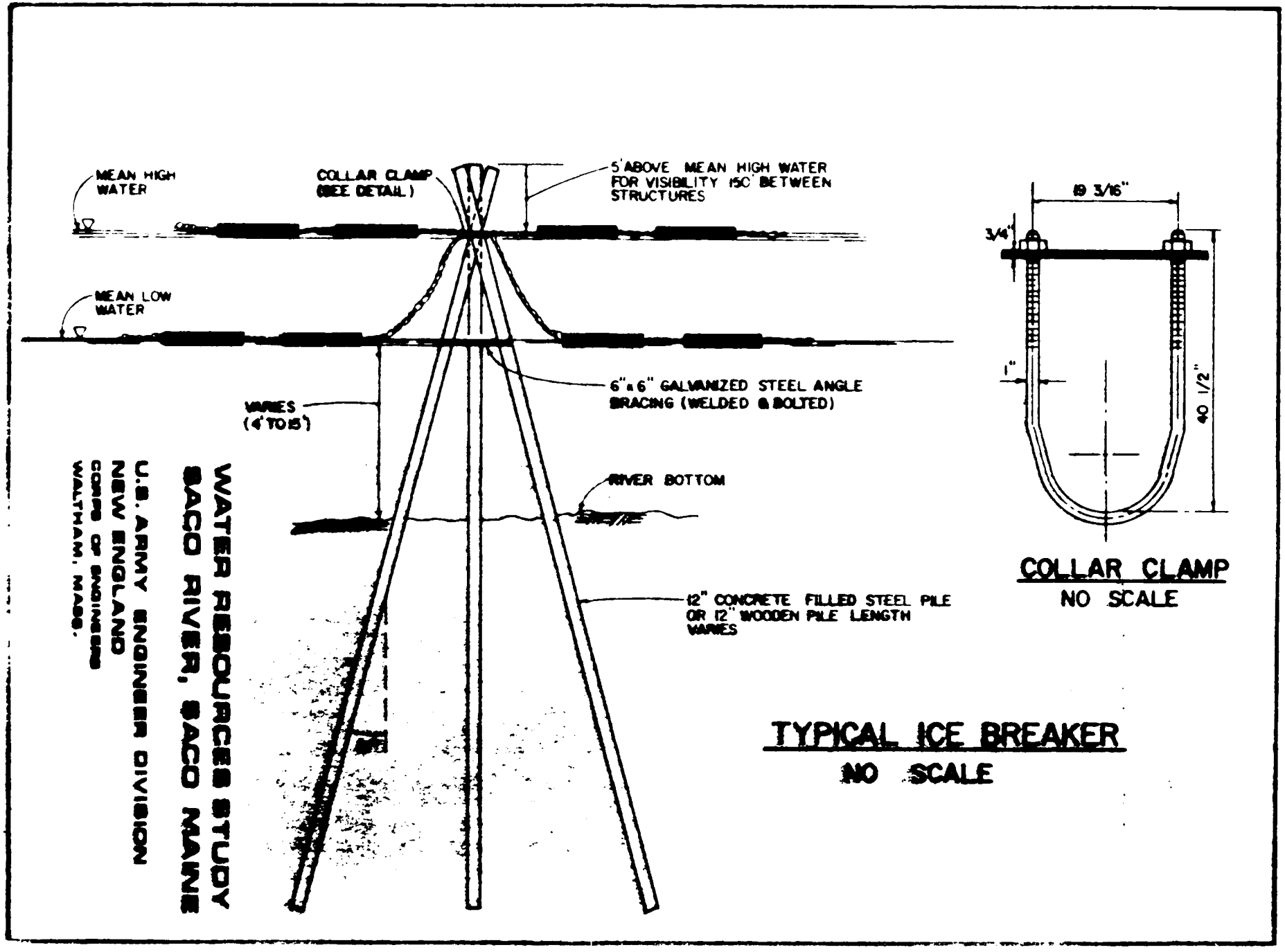
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MONTPELIER NO. 4

DRAINAGE AREA

EAST MONTPELIER VERMONT

CLIENT NO.	04-0096		SCALE 1" = 4 MILES
ENGR.	WAL		DATE FEBRUARY, 1979


MEAN HIGH WATER
COLLAR CLAMP (SEE DETAIL)
5' ABOVE MEAN HIGH WATER FOR VISIBILITY 150' BETWEEN STRUCTURES
MEAN LOW WATER
6" x 6" GALVANIZED STEEL ANGLE BRACING (WELDED & BOLTED)
VARIES (4' TO 15')
RIVER BOTTOM
12" CONCRETE FILLED STEEL PILE OR 12" WOODEN PILE LENGTH VARIES
19 3/16"
3/4"
1"
40 1/2"
COLLAR CLAMP
NO SCALE
TYPICAL ICE BREAKER
NO SCALE
WATER RESOURCES STUDY
SACO RIVER, SACO MAINE
U.S. ARMY ENGINEER DIVISION
NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

APPENDIX E

Information as contained in the National Inventory of Dams

AD-A156 737 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
MONTPELIER NUMBER 4 (... (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV FEB 79

UNCLASSIFIED F/G 13/13 NL

END

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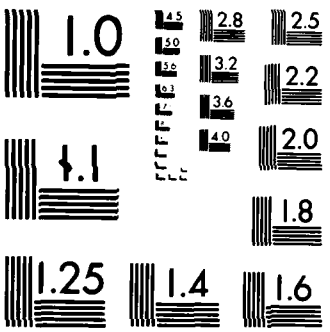
DTIC



INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
VT	[illegible]	00	VT	023	01				MONTPELIER NUMBER FOUR	4414.5	7231.5	20	FEB	79

POPULAR NAME	NAME OF IMPOUNDMENT

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01		WINOOSKI RIVER	MONTPELIER	2	8600

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	1ST DAM	FED R	PRV/FED	SCS A	VER/DATE
[illegible]	1909	H	26	26	59	16	ED	N	N	N	N	20FEB79

REMARKS

FLOOD CONTROL RESERVOIR	SPILLWAY LENGTH (FT.)	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
S	227	U	152	13400	1000											

OWNER	ENGINEERING BY	CONSTRUCTION BY
GREEN MOUNTAIN POWER CO.	UNKNOWN	CORY, DEVITT AND FROST

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
PUBLIC SERVICE BD	PUBLIC SERVICE BD	PUBLIC SERVICE BD	PUBLIC SERVICE BD

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
CORPS ENGRS NEW ENG CORP	21	NOV	78	PUBLIC LAW 92-367 AUG1972

REMARKS
SS-ABANDONED, UNOPERABLE

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR. DIST.	STATE	COUNTY	CONGR. DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
VT	[illegible]	ED	VT	023	01				MONTPELIER NUMBER FOUR	4414.5	7231.5	20FEB79

POPULAR NAME	NAME OF IMPOUNDMENT

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
2	1	WINOOSKI RIVER	MONTPELIER	2	8600

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
PGCI	1909	H	26	26	59	16	ED	N	N	N	N	20FEB79

REMARKS

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
S	227	U	152	13400	1000											

(NAVIGATION LOCKS: columns NO. through the last WIDTH)

OWNER	ENGINEERING BY	CONSTRUCTION BY
GREEN MOUNTAIN POWER CO.	UNKNOWN	CORY, DEVITT AND FROST

REGULATORY AGENCY DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
PUBLIC SERVICE BD	PUBLIC SERVICE BD	PUBLIC SERVICE BD	PUBLIC SERVICE BD

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
[illegible] ESNE HENGY ENG CORP	21NOV78	PUBLIC LAW 92-367 8AUG1972

REMARKS

55-ABANDONED,INOPERABLE

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST	STATE	COUNTY	CONGR DIST	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
VT	[illegible]	ED	VT	023	01				MONTPELIER NUMBER FOUR	4414.3	7231.5	2 FEB79

POPULAR NAME	NAME OF IMPOUNDMENT

REGION BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
2 1	WINOOSKI RIVER	MONTPELIER	2	8600

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
[illegible]	1909	H	26	26	39	16	[illegible]	N	N	N	N	20FEB79

REMARKS

D/S HAS	SPILLWAY LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
3	227	U	152	13400	1000											

OWNER	ENGINEERING BY	CONSTRUCTION BY
GREEN MOUNTAIN POWER CO.	UNKNOWN	CORY, DEVITT AND FROST

REGULATORY AGENCY DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
PUBLIC SERVICE BD	PUBLIC SERVICE BD	PUBLIC SERVICE BD	PUBLIC SERVICE BD

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
DUFRESNE HENRY ENG CORP	21NOV78	PUBLIC LAW 92-367 8AUG1972

REMARKS
35-ABANDONED, INOPERABLE

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE COUNTY	CONGR DIST	STATE COUNTY	CONGR DIST	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
VT	[illegible]	CO	VT 023	01			MONTPELIER NUMBER FOUR	4414.5	7231.5	27	FEB	79

POPULAR NAME	NAME OF IMPOUNDMENT

REGION/BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI)	POPULATION
[illegible]	WINOOSKI RIVER	MONTPELIER	2	8600

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT)	HYDRAULIC HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT)	1ST DAM	FED H	PRV/FED	SCS A	VER/DATE
[illegible]	1909	H	20	20	59	10	[illegible]	N	N	N	N	27FEB79

REMARKS

NAT	SPILLWAY TYPE	SPILLWAY WIDTH (FT)	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
S	U	152	15400	1000													

OWNER	ENGINEERING BY	CONSTRUCTION BY
GREEN MOUNTAIN POWER CO.	USACOE	CORY, DEVITT AND PROST

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
PUBLIC SERVICE BD	PUBLIC SERVICE BD	PUBLIC SERVICE BD	PUBLIC SERVICE BD

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
[illegible] ENG CORP	21	NOV	78	PUBLIC LAW 92-367 AUG1972

REMARKS
35-ABANDONED, UNOPERABLE

This Phase I Inspection Report on Montpelier Number Four has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

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Engineering Division

Joseph A. McElroy

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Foundation & Materials Branch
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CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED-E

JUN 13 1974

Green Mountain Power Corporation
Montpelier
Vermont 05602

Gentlemen:

Forwarded herewith for your information and use is a copy of the Inspection Report on the Montpelier No. 4 Dam. This inspection was made under the authority of Public Law 92-367 by the firm of Dufresne-Henry Engineering Corporation, North Springfield, Vermont under the direction and supervision of the Corps of Engineers. A copy of the finished report has been forarded to the Governor and the Department of Water Resources, the cooperating agency for the State of Vermont.

Section 7 of the report contains an evaluation and recommendations. If you have any questions concerning this report, contact the Department of Water Resources first. Then, if there are further questions contact the Project Management Branch, Engineering Division of this office. We thank you for your cooperation and assistance in carrying out this program.

Sincerely yours,

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

Incl
As Stated

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
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NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
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Mr. Reginald A. LaRosa, Acting Commissioner
Department of Water Resources
State of Vermont
Montpelier, Vermont 05602

Dear Mr. LaRosa:

Forwarded herewith for your information and use is a copy of the Phase I Inspection Report on Montpelier No. 4 Dam. This inspection was performed in accordance with Public Law 92-367 under the direction of the Corps of Engineers. Copies of the finished report have been forwarded to the Governor and the owner. We thank you for your cooperation and assistance in carrying out this program and hope this report will help you to develop an effective dam safety program.

Sincerely yours,

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Chief, Engineering Division

Incl
As stated

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NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

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ATTENTION OF:
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Department of Water Resources
State of Vermont
Montpelier, Vermont 05602

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

Honorable Richard A. Snelling
Governor of the State of Vermont
State Capitol
Montpelier, Vermont 05602

Dear Governor Snelling:

I am forwarding to you a copy of the Montpelier No. 4 Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Water Resources, the cooperating agency for the State of Vermont. In addition, a copy of the report has also been furnished the owner, Green Mountain Power Corporation, Montpelier, Vermont 05602.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Water Resources for your cooperation in carrying out this program.

Sincerely yours,

[illegible]
Colonel, Corps of Engineers
Division Engineer

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
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NEDED

JUN 14 1979

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JOHN P. CHAMPLIN
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

END

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